HYT

SERVICE MANUAL

TWO-WAY RADIO

TC-500

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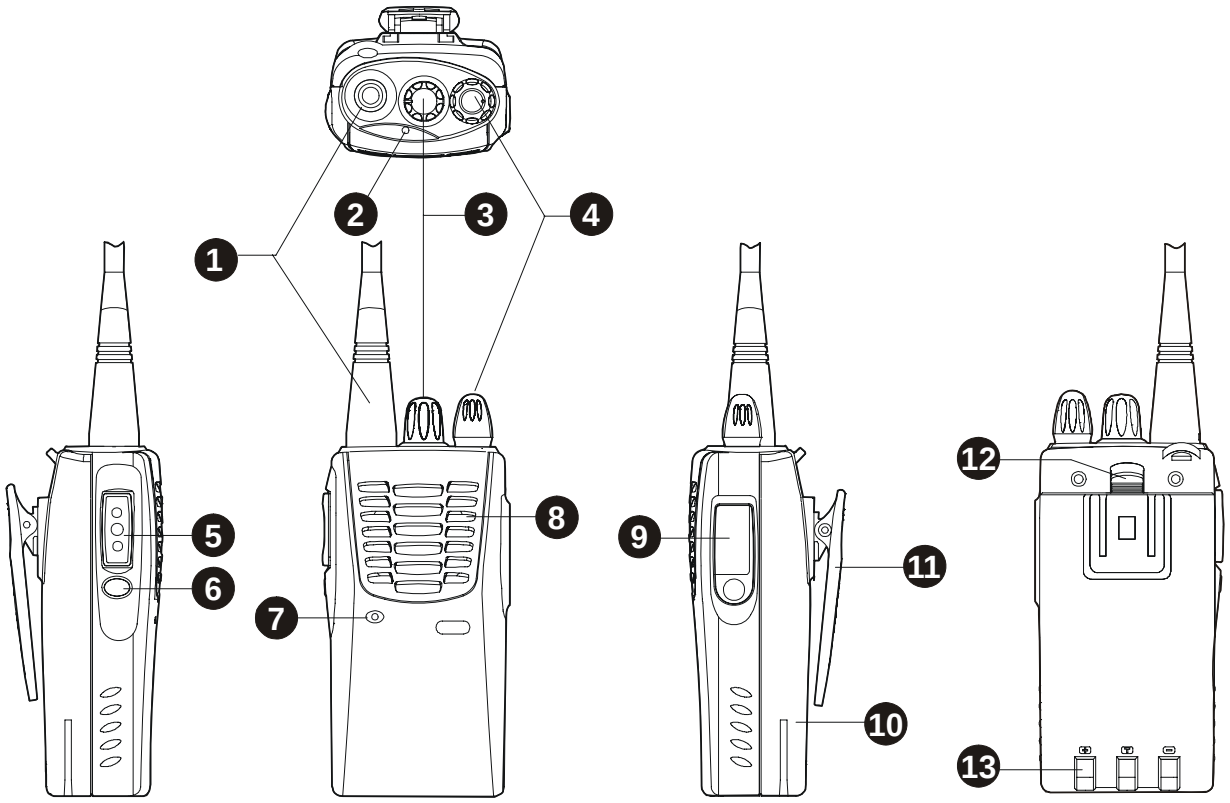
1. Introduction

Intended User

This manual is intended for use by qualified technicians only.

2. Product Controls



(1) Antenna	(2) LED Indicator	(3) Channel Selector Knob	(4) Power On-Off/Volume Control Knob
(5) PTT Key	(6) MONI Key	(7) Microphone	(8) Speaker
(9) Accessory Jack	(10) Battery	(11) Belt Clip	(12) Battery Latch
(13) Charging Piece	/	/	/

＊ PTT (Push-to-Talk) Key

Hold the **PTT** key to transmit, and release it to receive.

＊ SK1 Key

Side Key 1 is a programmable key that can be assigned with long press function and short press function by your dealer.

Functions below are programmed by factory default:

Key	Operation	Description
SK1 Key	Short press	Squelch Off
	Long press	VOX

＊ Channel Selector Knob

Rotate the knob to select your desired channel.

＊ Power On-Off/Volume Control Knob

Rotate the knob to turn the radio on/off or to adjust the volume.

＊ LED Indicator

See the table below for LED and alert tone indications:

Item		Indication
Wired-Clone	To enter Wired Clone Mode: Source radio: turn it on with **MONI** key held for approximately 2 seconds; Target radio: turn it on directly.	The LED on the source radio flashes red once during the power-on process.
	Status of the source radio in Wired Clone Mode (After the target radio is turned on and the cloning cable is connected, press the **PTT** key of the source radio to begin cloning.)	The LED glows red during cloning process. Error occurs during cloning: ● Clone Mode: At the start of cloning, frequency band and Model ID will be checked. The LED glows orange for 2 seconds and then goes out to indicate a failed check. If the check is successfully carried out but error occurs during cloning, the LED will flash orange. In this situation, press any key to make it go out. ● Factory Clone Mode: The LED flashes orange in presence of error. Press any key to make it go out. The LED glows green once cloning is completed.
	Status of the target radio in Wired Clone Mode	● The LED glows green during cloning. ● The green LED goes out after cloning is completed.

Item	Indication
Power On (to enter User Mode)	When the radio is turned on, a power-on alert tone sounds. When the radio is currently on a blank channel, it sounds beep tones continuously.
Low Battery Alert	The LED flashes red, and the low-pitched tone sounds every 20 seconds (programmable by the dealer).
Transmitting	The LED glows red during transmitting. When TOT timer expires, the radio sounds beep tone continuously. A TOT pre-alert tone sounds before the TOT timer expires.
Receiving	The LED glows green during receiving.
Scanning	The LED flashes green once per second during scanning. ● Scan Start Alert (programmable by the dealer): one beep will sound. ● Scan End Alert (programmable by the dealer): two continuous beeps will sound.
Writing/Reading	● The LED glows red when the PC is reading data from the radio. ● The LED glows green when the PC is writing data into the radio.
Power Adjustment	● A low-pitched tone sounds when the radio switches from high power to low power. ● A high-pitched tone sounds when the radio switches from low power to high power.
VOX/Channel Lock	● One audio alert for enabling; ● Two audio alerts for disabling;

3. Software Specifications

3.1 Function List

- Channel Capacity: 1 – 16
- Channel Spacing: 25KHz/12.5KHz*
- Channel Scan
- RX/TX status indication (red/green LED)
- CTCSS/CDCSS (38 groups of CTCSS, 83 groups of CDCSS, and CTCSS Tail Invert by 180 degrees.)
- Low battery alert
- Battery Save
- Unlock Detection and Emergency Alarm
- 2 Selectable Squelch Levels
- Monitor Button
- Time-out Timer (TOT)
- Squelch Tail Elimination
- PC Programming (manual/ automatic tuning)
- High/Low Power Switch (4.0/ 2.0W）
- Wide & Narrow Bandwidth Compatible*
- Wired Clone
- Battery Strength Indicator
- Manual Tuning

Note:

Note: *: indicates optional functions.

3.2 Programmable Key Functions

You dealer can assign any of the following functions to MONI key:

- None
- Monitor Button
- Monitor Momentary

- Scanning
- Squelch Off
- Squelch Off Momentary
- Power Adjustment
- Battery Strength Indicator

3.3 Description of Modes

3.3.1 User Mode

It is a conventional communication mode. The radio will enter this mode by default after power-on.

3.3.2 PC Programming Mode

The radio in User Mode enters PC Programming Mode through specific protocol based communication with the programming software. In this mode, radio functions and adjustment parameters can be set through the programming software (including User Version and Factory Version).

3.3.3 Wired Clone Mode

Description

Wired Clone Mode is an independent mode. To access other modes, you must restart the radio.

Wired Clone Mode includes Clone Mode and Factory Clone Mode.

- Clone Mode

  Connect two radios using a cloning cable. Power on the source radio while holding **MONI** key; the radio will enter Clone Mode in approximately 2 seconds. Then directly power on the target radio to enter the User Mode. In this mode, data stored in EEPROM of the source radio will be cloned to EEPROM of the target radio. The data transferred only involves channel data and common parameters, excluding tuning data, version and serial No. of the model.

- Factory Clone Mode

  Connect two radios using a clone cable. Power on the source radio while holding **MONI** key, the radio will enter Clone Mode in approximately 2 seconds. Press **MONI** key afterwards to switch to Factory Clone Mode. The target radio can be directly turned on to enter user mode. The data transferred covers all data in EEPROM (including settings for the Manual Tune Switch), other than the serial No.

Process

- The LED flashes red once after the source radio enters the Wired Clone Mode. Press **PTT** to begin to clone data to the target radio.

- During cloning, LED of the source radio solidly glows red, and LED of the target radio solidly glows green. When cloning is completed, LED of the source radio solidly glows green, and the green LED of the target radio goes out, which indicates the preparation for another clone.
- If any abnormal situation occurs during cloning, the source radio will stop cloning and its LED will flash orange, which indicates the preparation for another clone.
- When cloning is completed, the source radio goes back to standby status. Press **PTT** again to begin another clone.

3.3.4 Manual Tune Mode

In this mode, you can manually tune the frequency deviation, power level and squelch level and etc.

Description of Tuning:

To enter Manual Tune Mode

Hold the **PTT** and **MONI** key for 2 seconds while powering on the radio. The LED glows orange to indicate that the radio has entered the Manual Tune Mode. When the keys are released, the radio will enter item N of Tx group (N depends on the position where the **Channel Selector Knob** locates).

(Note: To enter the Manual Tune Mode, make sure its switch is set to Open via the programming software. If this option is unchecked, the radio can not enter this mode, which helps avoid change of parameters and degradation of radio performance caused by user's misoperations.) Keep this option unchecked after values are well adjusted from factory, to avoid any unexpected change of values. Such values can only be reset and changed in Manual Tune Mode only. ）

To switch between TX Tuning items and RX Tuning items

Rotate the **Channel Selector** knob to switch between TX tuning items and RX tuning items.

The LED glows red for TX tuning items and green for RX tuning items.

To switch between tuning items within TX group/RX group

- TX group

  CH1-CH9 respectively represent TX Low Power, TX High Power, CDCSS Balance, CDCSS Deviation, CTCSS Deviation (low), CTCSS Deviation (medium), CTCSS Deviation (high), TX Low Voltage Threshold and Max. TX Audio Deviation.

- RX group

  CH10-CH13 respectively stands for SQL Normal Open, SQL Normal Close, Rx Low Voltage Threshold and Bandpass Filter.

  The LED solidly glows green during RX group tuning (CH10-CH13).

  CH14-CH16 are unavailable and LED will go out.

To switch between wide and narrow bands

Under a certain tuning item, long press the **PTT** key (the LED flashes orange to indicate valid press) to switch between wide and narrow bands. After the band is selected, the first frequency of the current band is the frequency for tuning by default.

To switch the frequency

Under a certain band, short press the **PTT** key (the LED flashes green to indicate valid press) to switch the frequency orderly.

To tune the value

Under a certain band, short press **MONI** key to increase the value in step of 1, or hold this key to increase the value continuously in steps of 1. When it reaches the maximum value, pressing **MONI** key again would increase the value from 0.

Special tuning items

- TX group

  CH8 represents TX Low Voltage Threshold, which is related to AD sampling. Press the **MONI** key after entering the above item, to activate AD sampling (including calculation) once. Rotate the **Channel Selector** knob to save the current AD sampling value.

- RX group

  CH10-CH12 represents SQL Normal Open, SQL Normal Close and RX Low Voltage Threshold respectively. These items are related to AD sampling. Press the **MONI** key after entering the above item, to activate AD sampling (including calculation) once. Rotate the **Channel Selector** knob to save the current AD sampling value.

About the Key-press

- Short press: key-press time shorter than 1 second;
- Long press: key-press time longer than 1 second.

4. Circuit Description

4.1 General Principle Diagram

The general circuit is composed of RDA chip circuit, TX circuit, RX circuit, power supply circuit, control circuit, etc. See the block diagram below:

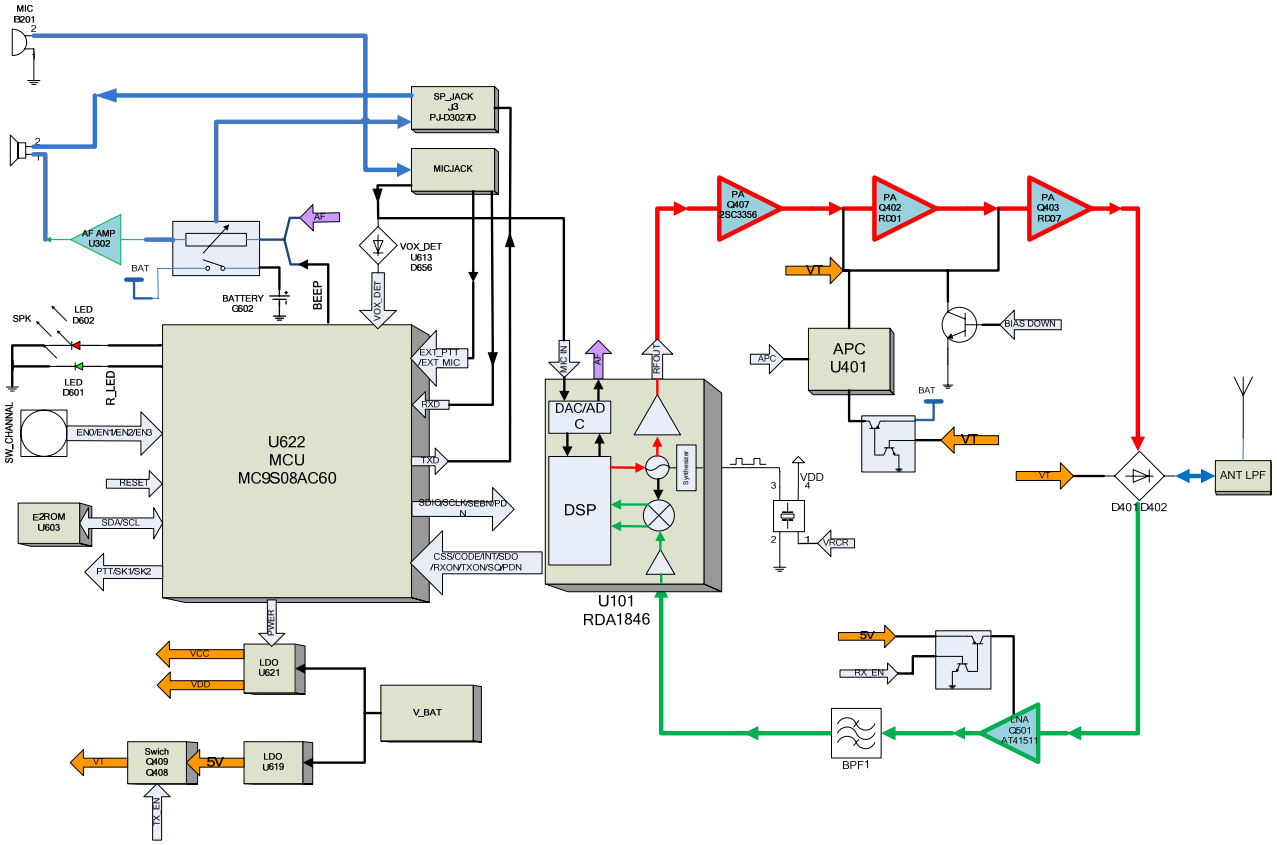


Figure 1

- RDA Chip Circuit

  This chip is highly integrated. Its function includes voice signal processing/modulation/demodulation, DSP, VCO, PLL, LNA and RF IF. The voice signal from MIC goes to RDA chip for amplification. Next, the amplified voice signal will undergo a series of processing including A/D conversion, filtering, pre-emphasizing, gain control, amplitude limit and D/A conversion. Then the analog voice signal is delivered to VCO and amplified to a signal with 8dBm. When the RX RF signal enters this chip, it would experience demodulation, filtering, de-emphasizing and gain control. Finally, the signal is output to the audio amplifier.

- TX Circuit

The modulated RF signal from RDA chip goes to Q407 and Q402 for amplification, and then further amplified by Q403. Then the amplified signal is delivered to low-pass filter to filter out the high-order harmonics. Finally, it is sent via the antenna.

- RX Circuit

  After going through LPF and amplitude limiter, the RF signal received from the antenna enters Q501 LNA for amplification. Then the BPF will filter the signal to remove other unwanted signals. The resulting signal is delivered to RDA chip for demodulation. After that, the voice signal from demodulation is output U302 for amplification, which is finally output from the speaker.

- Power Circuit

  LDO U619 converts the 6V power supply into two 5V, which LDO U621 will convert into two 3.3v power supplies, powering VCC and VDD respectively. VCC powers CPU, while VDD powers RDA chip. Then Q409 converts the 5V power supply to VT to power the TX circuit.

4.2 Realization Methods of Basic Functional Modules

4.2.1 RDA Chip Circuit

This chip is highly integrated. Its function includes voice signal processing/modulation/demodulation, DSP, VCO, PLL, LNA and RF IF.

RDA Chip Circuit

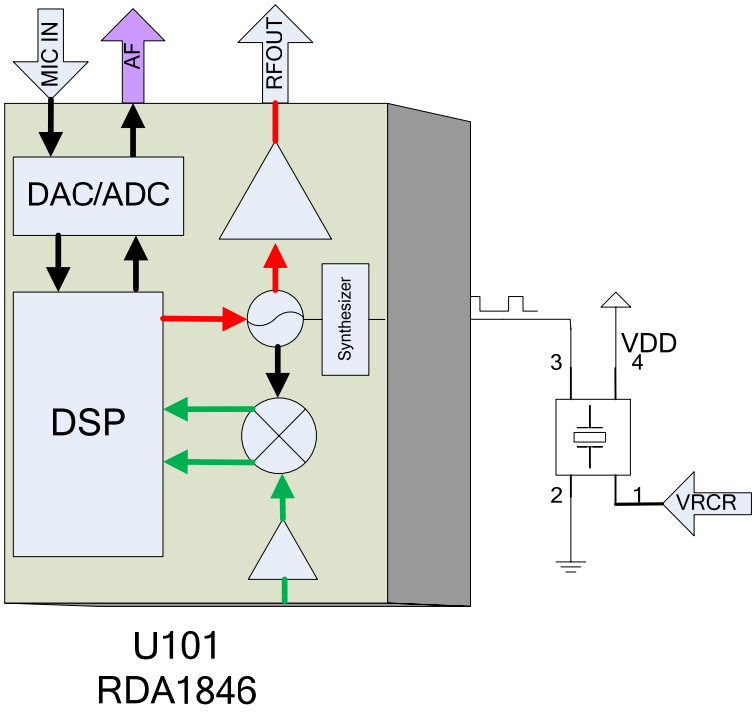
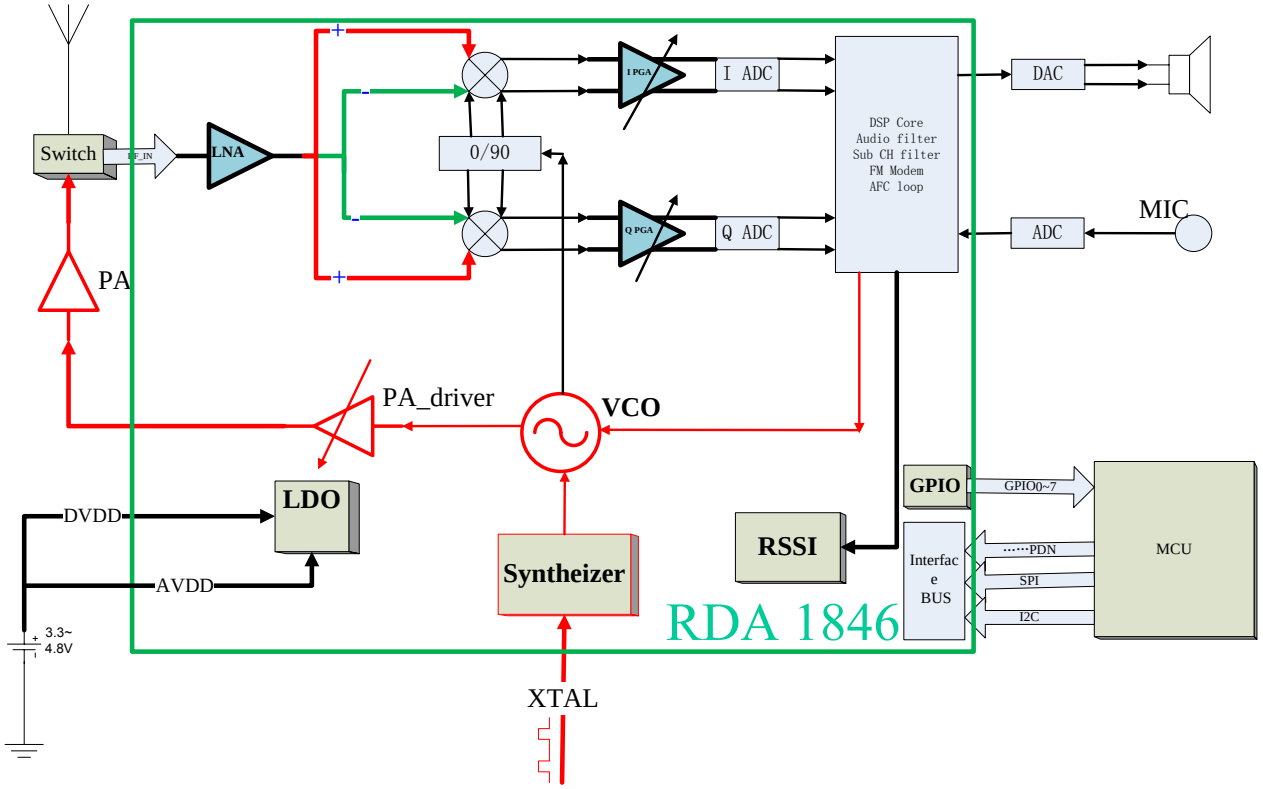


Figure 2

The reference clock signal of RDA chip is provided by 26MHZ crystal oscillator. The block diagram is

given below:



After entering RDA chip via MIC, the voice signal will undergo A/D conversion to get digital signal, which will be delivered to DSP for further processing such as filtering, amplification, amplitude-limiting and pre-emphasizing. Then the resulting voice signal is modulated to the internal VCO and output after being amplified by the driver amplifier. At the RX end, the received RF signal will go to LNA for amplification first, and then go to IF demodulation circuit to get demodulated voice signal. After gain control, such signal is converted into digital signal, which will enter DSP for further processing such as filtering, amplification and de-emphasizing.

The function of RDA is subject to MCU U622 and its reference clock signal is from 26MHZ crystal oscillator. This chip is applicable to UHF (400~520MHZ) and VHF (134~174MHZ). The NF can be up to 3dB and IIP3 up to -6dBm, meeting GB and FCC requirements. Its RF output may reach up to 8dBm.

4.2.2 RF Power Amplifier Circuit (TX Section)

The block diagram of the RF power amplifier circuit is shown in the figure below:

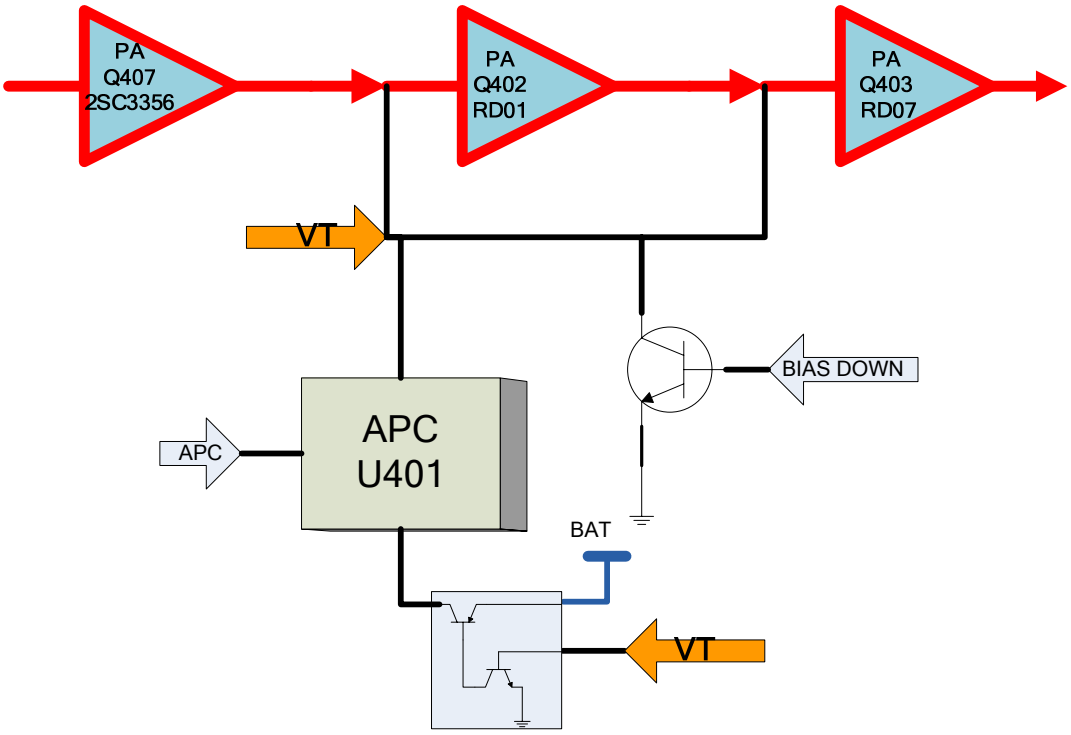


Figure 3

The modulated RF signal from RDA chip goes to Q407 and Q402 for amplification, and then further amplified by Q403. Then the amplified signal is delivered to low-pass filter to filter out the high-order harmonics. Finally, it is sent via the antenna. The control signal “VT” is used to control the operation of driver amplifier (Q407 and Q402). U401 works for auto power control (APC).

4.2.3 Receiver Circuit (RX Section)

The Block Diagram of RX Circuit is shown as below:

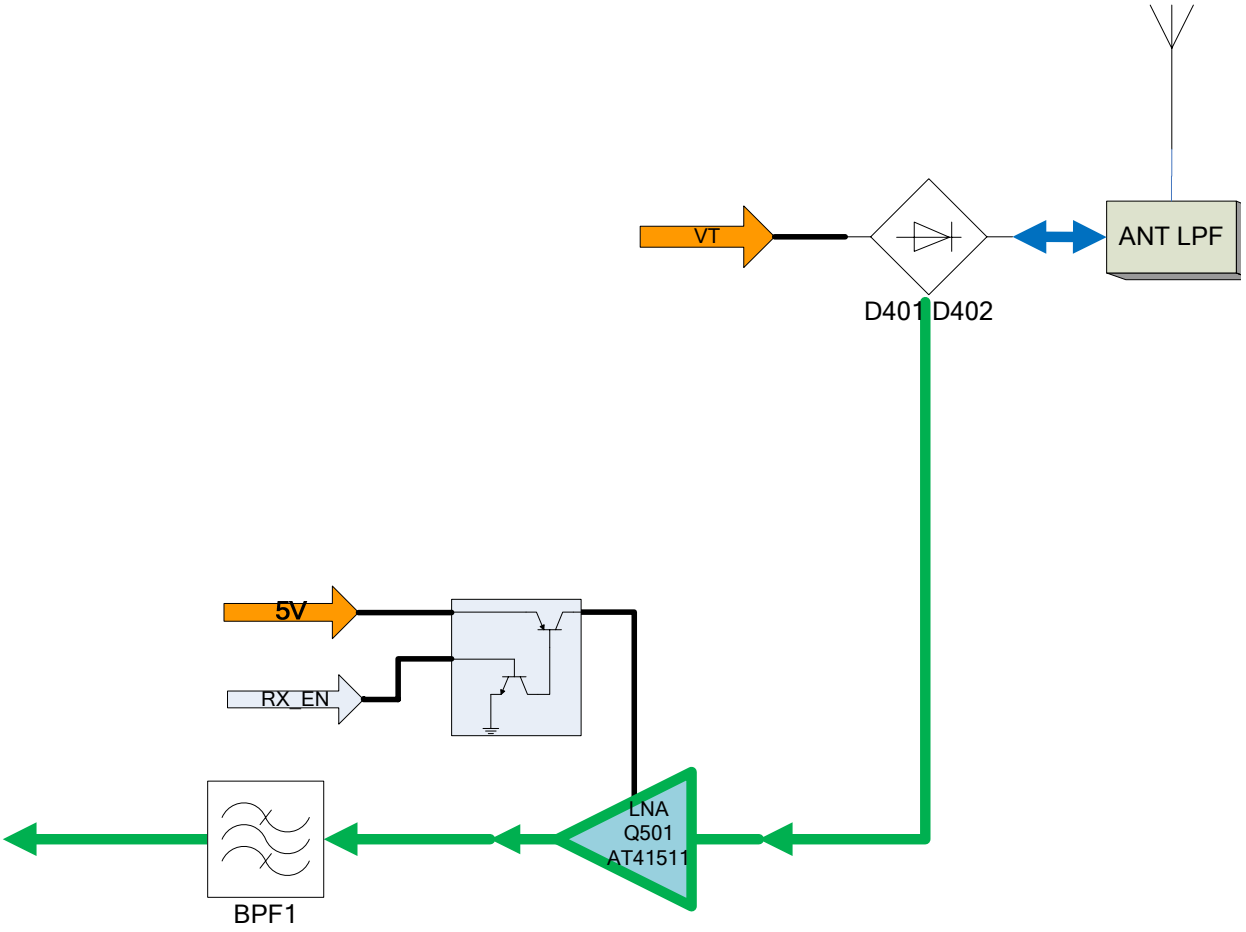


Figure 4

The RF signal is received via the antenna. After going through LPF and amplitude limiter, the signal is amplified by Q501 LNA. The LNA adopts 2SC3356 with current <5mA and its gain is about 12dB.

Next, the BPF will remove the interference signal in amplified RF signal. Then the resulting signal goes to RDA chip for further processing. The processed signal is delivered to U302 for amplification and finally output by the speaker.

4.2.4 MCU Control, Signal Processing and Audio Amplification

Circuit diagram of this section is shown as below:

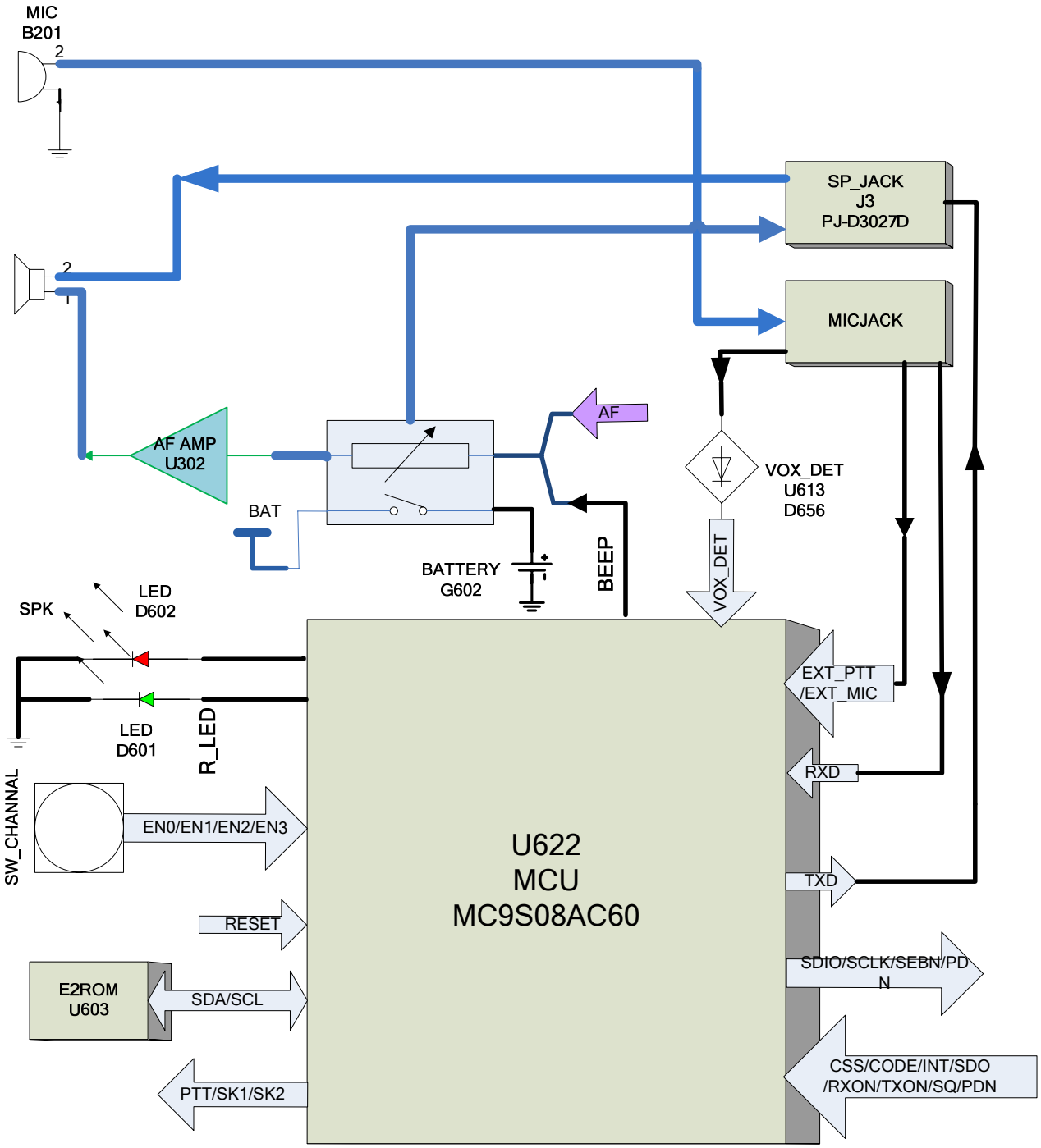


Figure5

MCU Control Circuit

MCU control circuit is composed of MCU, EEPROM, keys, etc. This section has the following functions: to initialize data of the radio and save data to EEPROM; to detect battery voltage and signals from external keys, LD and VOX, and to make response; to transmit required data to PLL based on the channel encoding status; to switch and control RX/TX based on the input PTT signal; to switch the squelch circuit on/off based on the input signaling decode signal and squelch level signal; to control circuits of high/low power switch, audio power amplifier, RDA chip power supply, RX power supply and

TX power supply; (for programming) to communicate with PC via RXD/TXD based on the RS232 protocol, and transmit/receive data to/from PC.

RDA Chip Control

By controlling the RDA chip, the MCU can realize these services: frequency setting, frequency bandwidth, reference clock, sleep mode, SQ, VOX, squelch, frequency deviation, voice filtering, signaling encoding/decoding, pre-emphasizing, gain control, amplitude limiting, de-emphasizing, etc.

Audio Amplifier

The audio signal output from U622 is amplified by the audio power amplifier (U302) to drive the speaker directly.

4.2.5 Power Supply Section

Block diagram of power supply circuit is shown as below:

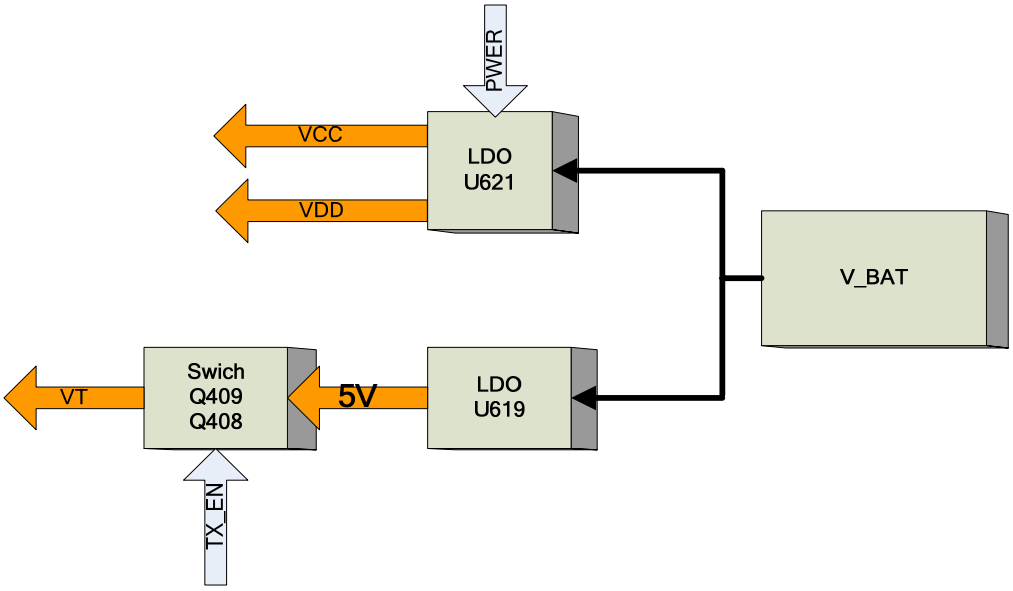


Figure 6

LDO U619 converts the 6V power supply into two 5V, which LDO U621 will convert into two 3.3v power supplies, powering VCC and VDD respectively. VCC powers CPU, while VDD powers RDA chip. Then Q409 converts the 5V power supply to VT to power the TX circuit.

5. CPU Pins

PIN No.	Pin Name	Definition	I/O	Description
1	PTC4	Reserved	I	Reserved
2	IRQ/TPMCLK	Reserved	I	Reserved
3	RESET	RESET	I	Reset
4	PTF0/TPM1CH2	BEEP	O	Tone
5	PTF1/TPM1CH3	VRCR	O	PWM output for freq. adjustment
6	PTF2/TPM1CH4	APC	O	PWM output for PA APC
7	PTF3/TPM1CH5	CSS	I	Detection pin, CDCSS status output
8	PTF4/TPM2CH0	TXON	I	TX status detection pin
9	PTC6	PWER	O	Radio power control pin
10	PTF7	Reserved	I	Reserved
11	PTF5/TPM2CH1	RXON	I	RX status detection pin
12	PTF6	Reserved	I	Reserved
13	PTE0/TxD1	UART_TXD	O	Port
14	PTE1/RxD1	UART_RXD	I	Port
15	PTE2/TPM1CH0	INT	I	Detection pin, programmable
16	PTE3/TPM1CH1	CODE	I/O	Detection pin, modulated digital signal input/output
17	PTE4/SS1	SEBN	O	SPI port of communication
18	PTE5/MISO1	SDO	I	SPI port of communication
19	PTE6/MOSI1	SDIO	O	SPI port of communication
20	PTE7/SPSCK1	SCLK	O	SPI port of communication
21	VSS	VSS	/	Ground
22	VDD	VDD	/	Power Supply

PIN No.	Pin Name	Definition	I/O	Description
23	PTG0/KBI1P0	SQ	I	Detection pin, SQ status check
24	PTG1/KBI1P1	TX_EN	O	TX power supply control
25	PTG2/KBI1P2	RX_EN	O	RX power supply control
26	PTA0	EN1	I	Rotary switch
27	PTA1	EN2	I	Rotary switch
28	PTA2	EN3	I	Rotary switch
29	PTA3	EN4	I	Rotary switch
30	PTA4	Reserved	O	Reserved
31	PTA5	Reserved	O	Reserved
32	PTA6	Reserved	O	Reserved
33	PTA7	PDN	O	Sleep control
34	PTB0/TPM3CH0/AD1P0	Reserved	O	Reserved
35	PTB1/TPM3CH1/AD1P1	Reserved	O	Reserved
36	PTB2/AD1P2	Reserved	O	Reserved
37	PTB3/AD1P3	VOX_DET	AD	VOX control
38	PTB4/AD1P4	EXT_MIC	I	External microphone
39	PTB5/AD1P5	EXT_PTT	I	External PTT
40	PTB6/AD1P6	APA_EN	O	Audio power amplifier switch
41	PTB7/AD1P7	R_LED	O	Red LED indicator
42	PTD0/AD1P8	G_LED	O	Green LED indicator
43	PTD1/AD1P9	Reserved	O	Reserved
44	VDDAD	VDD_AD	/	Power supply for digital circuit
45	VSSAD	VSS_AD	/	Ground (digital)
46	PTD2/KBI1P5/AD1P10	SDA	I/O	External EEPROM
47	PTD3/KBI1P6/AD1P11	SCL	O	External EEPROM

PIN No.	Pin Name	Definition	I/O	Description
48	PTG3/KBI1P3	Reserved	O	Reserved
49	PTG4/KBI1P4	Reserved	O	Reserved
50	PTD4/TPM2CLK/AD1P12	BAT_DET	AD	Battery detection
51	PTD5/AD1P13	Reserved	O	Reserved
52	PTD6/TPM1CLK/AD1P14	Reserved	O	Reserved
53	PTD7/KBI1P7/AD1P15	Reserved	O	Reserved
54	VREFH	VREFH	/	AD reference voltage
55	VREFL	VREFL	/	AD reference grounding
56	BKGD/MS	BKGD	/	Tuning communication
57	PTG5/XTAL	XTAL	/	External crystal
58	PTG6/EXTAL	EXTAL	/	External crystal
59	VSS	VSS	/	Power supply grounding
60	PTC0/SCL1	Reserved	O	Reserved
61	PTC1/SDA1	BIAS_DOWN	O	Discharge control for TX PA
62	PTC2/MCLK	Reserved	O	Reserved
63	PTC3/TxD2	SK1	I	SK1
64	PTC5/RxD2	PTT	I	PTT

6. Parts List 1

No.	Ref No.	Print No.	Part No.	Description	Qty.
1	R419	T2C	3099080398000	Chip resistor 0.39Ω J 1/4W 1206 (RoHS)	1
2	R420	T2C	3099080398000	Chip resistor 0.39Ω J 1/4W 1206 (RoHS)	1
3	R421	T2B	3099080398000	Chip resistor 0.39Ω J 1/4W 1206 (RoHS)	1
4	L102	B3E	3001060000000	Chip resistor 0Ω J 1/10W 0603 (RoHS)	1
5	L609	T2G	3001060000000	Chip resistor 0Ω J 1/10W 0604 (RoHS)	1
6	L610	T2G	3001060000000	Chip resistor 0Ω J 1/10W 0605 (RoHS)	1
7	C137	B2E	3001050000000	Chip resistor 0Ω J 1/16W 0402 (RoHS)	1
8	R126	B2H	3001050000000	Chip resistor 0Ω J 1/16W 0402 (RoHS)	1
9	R145	B1H	3001050000000	Chip resistor 0Ω J 1/16W 0402 (RoHS)	1
10	R520	B1F	3001050000000	Chip resistor 0Ω J 1/16W 0402 (RoHS)	1
11	R523	B1F	3001050000000	Chip resistor 0Ω J 1/16W 0402 (RoHS)	1
12	R607	T3H	3001050000000	Chip resistor 0Ω J 1/16W 0402 (RoHS)	1
13	R608	T3H	3001050000000	Chip resistor 0Ω J 1/16W 0402 (RoHS)	1
14	R635	B3I	3001050000000	Chip resistor 0Ω J 1/16W 0402 (RoHS)	1
15	R416	B2C	3001051220000	Chip resistor 1.2KΩ J 1/16W 0402 (RoHS)	1
16	R440	B3E	3001051520000	Chip resistor 1.5KΩ J 1/16W 0402 (RoHS)	1
17	R417	B3C	3001051820000	Chip resistor 1.8KΩ J 1/16W 0402 (RoHS)	1
18	R213	B5F	3001051040000	Chip resistor 100KΩ F 1/16W 0402 (RoHS)	1
19	R221	T3E	3001051040000	Chip resistor 100KΩ F 1/16W 0403 (RoHS)	1
20	R405	T2D	3001051040000	Chip resistor 100KΩ F 1/16W 0404 (RoHS)	1
21	R603	T4J	3001051040000	Chip resistor 100KΩ F 1/16W 0405 (RoHS)	1
22	R634	B5H	3001051040000	Chip resistor 100KΩ F 1/16W 0406 (RoHS)	1
23	R101	B2I	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
24	R131	B2H	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
25	R132	B2H	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
26	R133	B2H	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
27	R134	B2H	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
28	R135	B2H	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
29	R136	B2H	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
30	R137	B2H	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
31	R138	B2G	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
32	R139	B2G	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
33	R141	B2G	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
34	R142	B1H	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
35	R604	T3J	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
36	R615	B5D	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
37	R621	B4D	3001051010000	Chip resistor 100Ω J 1/16W 0402 (RoHS)	1
38	R129	B2H	3001051030000	Chip resistor 10KΩ J 1/16W 0402 (RoHS)	1
39	R130	B2H	3001051030000	Chip resistor 10KΩ J 1/16W 0402 (RoHS)	1
40	R219	T3E	3001051030000	Chip resistor 10KΩ J 1/16W 0402 (RoHS)	1
41	R428	T2D	3001051030000	Chip resistor 10KΩ J 1/16W 0402 (RoHS)	1

No.	Ref No.	Print No.	Part No.	Description	Qty.
42	R646	T3I	3001051030000	Chip resistor 10KΩ J 1/16W 0402 (RoHS)	1
43	R685	T3I	3001051030000	Chip resistor 10KΩ J 1/16W 0402 (RoHS)	1
44	R686	T3I	3001051030000	Chip resistor 10KΩ J 1/16W 0402 (RoHS)	1
45	R629	B3I	3001051060000	Chip resistor 10M J 1/16W 0402 (RoHS)	1
46	R315	T4A	3001051000020	Chip resistor 10Ω F 1/16W 0402 (RoHS)	1
47	R442	T2D	3001051000020	Chip resistor 10Ω F 1/16W 0402 (RoHS)	1
48	R633	B5G	3001051000020	Chip resistor 10Ω F 1/16W 0402 (RoHS)	1
49	R512	B1E	3001051330000	Chip resistor 13KΩ F 1/16W 0402 (RoHS)	1
50	R422	T2C	3001061540010	Chip resistor 150KΩ D 1/10W 0603 (RoHS)	1
51	R423	T2C	3001061540010	Chip resistor 150KΩ D 1/10W 0603 (RoHS)	1
52	R424	T2C	3001061540010	Chip resistor 150KΩ D 1/10W 0603 (RoHS)	1
53	R425	T2D	3001061540010	Chip resistor 150KΩ D 1/10W 0603 (RoHS)	1
54	R426	T2D	3001061540010	Chip resistor 150KΩ D 1/10W 0603 (RoHS)	1
55	R427	T2D	3001061540010	Chip resistor 150KΩ D 1/10W 0603 (RoHS)	1
56	R314	T3H	3001051530000	Chip resistor 15KΩ J 1/16W 0402 (RoHS)	1
57	R627	B5G	3001051530000	Chip resistor 15KΩ J 1/16W 0402 (RoHS)	1
58	R631	B5G	3001051830010	Chip resistor 18KΩ F 1/16W 0402 (RoHS)	1
59	R632	B5G	3001051830010	Chip resistor 18KΩ F 1/16W 0402 (RoHS)	1
60	R636	B4G	3001051830010	Chip resistor 18KΩ F 1/16W 0402 (RoHS)	1
61	R637	B4G	3001051830010	Chip resistor 18KΩ F 1/16W 0402 (RoHS)	1
62	R638	B4G	3001051830010	Chip resistor 18KΩ F 1/16W 0402 (RoHS)	1
63	R125	B1I	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
64	R127	B1H	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
65	R214	B5G	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
66	R313	T4E	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
67	R323	T4E	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
68	R414	B3D	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
69	R515	B1E	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
70	R614	B5D	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
71	R639	B5H	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
72	R690	T1J	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
73	R691	T1J	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
74	R692	T1J	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
75	R693	T1J	3001051020000	Chip resistor 1KΩ F 1/16W 0402 (RoHS)	1
76	R218	T3E	3001051050000	Chip resistor 1MΩ F 1/16W 0402 (RoHS)	1
77	R628	B5G	3001051050001	Chip resistor 1MΩ F 1/16W 0403 (RoHS)	1
78	R202	T2E	3001052220010	Chip resistor 2.2KΩ F 1/16W 0402 (RoHS)	1
79	R310	T5E	3001052220010	Chip resistor 2.2KΩ F 1/16W 0402 (RoHS)	1
80	R625	T2A	3001052220010	Chip resistor 2.2KΩ F 1/16W 0402 (RoHS)	1
81	R514	B2E	3001052720010	Chip resistor 2.7KΩ F 1/16W 0402 (RoHS)	1
82	R620	B5D	3001052720010	Chip resistor 2.7KΩ F 1/16W 0402 (RoHS)	1
83	R602	T4J	3001052240000	Chip resistor 220KΩ J 1/16W 0402 (RoHS)	1
84	R215	B5G	3001052230010	Chip resistor 22KΩ J 1/16W 0402 (RoHS)	1
85	R408	B2E	3001052200000	Chip resistor 22Ω J 1/16W 0402 (RoHS)	1

No.	Ref No.	Print No.	Part No.	Description	Qty.
86	R418	B2B	3001062710000	Chip resistor 270Ω J 1/10W 0603 (RoHS)	1
87	R444	B2B	3001062710000	Chip resistor 270Ω J 1/10W 0603 (RoHS)	1
88	R216	B5G	3001052730010	Chip resistor 27KΩ F 1/16W 0402 (RoHS)	1
89	R409	B3D	3001053310000	Chip resistor 330Ω F 1/16 0402 (RoHS)	1
90	R439	T2E	3001053330010	Chip resistor 33KΩ J 1/16W 0402 (RoHS)	1
91	R144	B1I	3001054720000	Chip resistor 4.7KΩ J 1/16W 0402 (RoHS)	1
92	R311	T5E	3001054720000	Chip resistor 4.7KΩ J 1/16W 0403 (RoHS)	1
93	R411	T2E	3001054720000	Chip resistor 4.7KΩ J 1/16W 0404 (RoHS)	1
94	R441	T2E	3001054720000	Chip resistor 4.7KΩ J 1/16W 0405 (RoHS)	1
95	R606	B3F	3001054720000	Chip resistor 4.7KΩ J 1/16W 0406 (RoHS)	1
96	R644	T3I	3001054720000	Chip resistor 4.7KΩ J 1/16W 0407 (RoHS)	1
97	R645	T3H	3001054720000	Chip resistor 4.7KΩ J 1/16W 0408 (RoHS)	1
98	R683	T3I	3001054720000	Chip resistor 4.7KΩ J 1/16W 0409 (RoHS)	1
99	R684	T3H	3001054720000	Chip resistor 4.7KΩ J 1/16W 0410 (RoHS)	1
100	R318	T4E	3001054790000	Chip resistor 4.7Ω J 1/16W 0402 (RoHS)	1
101	R201	T3E	3001054710000	Chip resistor 470Ω J 1/16W 0402 (RoHS)	1
102	R217	T3F	3001054730000	Chip resistor 47KΩ J 1/16W 0402 (RoHS)	1
103	R220	B5F	3001054730000	Chip resistor 47KΩ J 1/16W 0403 (RoHS)	1
104	R312	T4E	3001054730000	Chip resistor 47KΩ J 1/16W 0404 (RoHS)	1
105	R413	B3E	3001054730000	Chip resistor 47KΩ J 1/16W 0405 (RoHS)	1
106	R616	T4J	3001054730000	Chip resistor 47KΩ J 1/16W 0406 (RoHS)	1
107	R617	T4J	3001054730000	Chip resistor 47KΩ J 1/16W 0407 (RoHS)	1
108	R410	B2D	3001054700000	Chip resistor 47Ω J 1/16W 0402 (RoHS)	1
109	R415	B3C	3001054700000	Chip resistor 47Ω J 1/16W 0402 (RoHS)	1
110	R618	T4J	3001054700000	Chip resistor 47Ω J 1/16W 0402 (RoHS)	1
111	R619	T4J	3001054700000	Chip resistor 47Ω J 1/16W 0402 (RoHS)	1
112	R407	T2D	3001055110000	Chip resistor 510Ω J 1/16W 0402 (RoHS)	1
113	R519	B2F	3001055100020	Chip resistor 51Ω F 1/16W 0402 (RoHS)	1
114	R438	T2D	3001055630000	Chip resistor 56KΩ J 1/16W 0402 (RoHS)	1
115	R406	B3E	3001056810000	Chip resistor 680Ω J 1/16W 0402 (RoHS)	1
116	R605	T3A	3001056810000	Chip resistor 680Ω J 1/16W 0403 (RoHS)	1
117	R412	T2D	3001058210000	Chip resistor 820Ω J 1/16W 0402 (RoHS)	1
118	C420	B2D	3104081040020	Tantalum capacitor 0.1UF M 35V S (RoHS)	1
119	C452	B2C	3104081060120	Tantalum capacitor 10UF M 16V -55~+125℃ S (RoHS)	1
120	C611	T3F	3104081060120	Tantalum capacitor 10UF M 16V -55~+125℃ S (RoHS)	1
121	C614	B4D	3104081060120	Tantalum capacitor 10UF M 16V -55~+125℃ S (RoHS)	1
122	C285	T5E	3104202270010	Tantalum capacitor 220UF M 6.3V C (RoHS)	1
123	C323	T5F	3104084750070	Tantalum capacitor 4.7UF M 16V S (RoHS)	1
124	C501	B2C	3101050200010	Chip Capacitor 2PF B 50V C0G 0402 (RoHS)	1
125	C220	T2J	3101051030020	Chip Capacitor 0.01UF K 25V X7R 0402 (RoHS)	1
126	C322	T5F	3101051030020	Chip Capacitor 0.01UF K 25V X7R 0402 (RoHS)	1
127	C437	B2B	3101051030020	Chip Capacitor 0.01UF K 25V X7R 0402 (RoHS)	1
128	C457	B2B	3101051030020	Chip Capacitor 0.01UF K 25V X7R 0402 (RoHS)	1
129	C612	T2G	3101051030020	Chip Capacitor 0.01UF K 25V X7R 0402 (RoHS)	1

No.	Ref No.	Print No.	Part No.	Description	Qty.
130	C615	B2F	3101051030020	Chip Capacitor 0.01UF K 25V X7R 0402 (RoHS)	1
131	C630	T3I	3101051030020	Chip Capacitor 0.01UF K 25V X7R 0402 (RoHS)	1
132	C649	T3F	3101051030020	Chip Capacitor 0.01UF K 25V X7R 0402 (RoHS)	1
133	C664	B3F	3101051030020	Chip Capacitor 0.01UF K 25V X7R 0402 (RoHS)	1
134	C645	T1C	3101052230000	Chip Capacitor 0.022UF K 16V X7R 0402 (RoHS)	1
135	C107	B2H	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
136	C110	B1G	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
137	C112	B1G	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
138	C116	B2G	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
139	C123	B2I	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
140	C130	B1I	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
141	C217	T3E	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
142	C326	T5E	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
143	C327	T4E	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
144	C331	T4E	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
145	C334	T5B	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
146	C417	B2C	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
147	C422	T2D	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
148	C436	B2B	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
149	C441	T2C	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
150	C453	B2B	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
151	C455	B3E	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
152	C463	T2E	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
153	C521	B2F	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
154	C606	B3F	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
155	C627	T3H	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
156	C629	T3J	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
157	C636	T3H	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
158	C637	T3H	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
159	C642	T2I	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
160	C650	T3H	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
161	C651	T3J	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
162	C655	T3H	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
163	C671	B5G	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
164	C672	B5G	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
165	C676	B5H	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
166	C682	T3I	3101051040060	Chip Capacitor 0.1UF K 16V X7R 0402 (RoHS)	1
167	C412	B2D	3101053340000	Chip Capacitor 0.33UF K 6.3V X5R 0402 (RoHS)	1
168	C433	B1A	3101060590010	Chip Capacitor 0.5PF B 50V COG 0603 (RoHS)	1
169	C429	B2A	3101061590010	Chip Capacitor 1.5PF B 50V COG 0603 (RoHS)	1
170	C102	B1I	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
171	C106	B2H	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
172	C109	B1G	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
173	C111	B1G	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1

No.	Ref No.	Print No.	Part No.	Description	Qty.
174	C113	B2G	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
175	C120	B1I	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
176	C126	B1I	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
177	C216	B5G	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
178	C219	T3E	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
179	C328	T4F	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
180	C514	B1F	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
181	C519	B2D	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
182	C525	B1F	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
183	C528	B2E	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
184	C563	B1E	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
185	C605	T3J	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
186	C613	T2G	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
187	C640	B2F	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
188	C670	B5G	3101051020010	Chip Capacitor 1000PF K 50V X7R 0402 (RoHS)	1
189	C105	B2H	3101051010030	Chip Capacitor 100PF J 50V C0G 0402 (RoHS)	1
190	C114	B2G	3101051010030	Chip Capacitor 100PF J 50V C0G 0402 (RoHS)	1
191	C138	B1G	3101051010030	Chip Capacitor 100PF J 50V C0G 0402 (RoHS)	1
192	C202	T2E	3101051010030	Chip Capacitor 100PF J 50V C0G 0402 (RoHS)	1
193	C203	B4D	3101051010030	Chip Capacitor 100PF J 50V C0G 0402 (RoHS)	1
194	C314	B5D	3101051010030	Chip Capacitor 100PF J 50V C0G 0402 (RoHS)	1
195	C689	T2I	3101051010030	Chip Capacitor 100PF J 50V C0G 0402 (RoHS)	1
196	C690	B5D	3101051010030	Chip Capacitor 100PF J 50V C0G 0402 (RoHS)	1
197	C103	B1I	3101051000020	Chip Capacitor 10PF J 50V C0G 0402 (RoHS)	1
198	C104	B1I	3101051000020	Chip Capacitor 10PF J 50V C0G 0402 (RoHS)	1
199	C448	B4B	3101061000000	Chip Capacitor 10PF J 50V C0G 0603 (RoHS)	1
200	C127	B1H	3101071060010	Chip Capacitor 10UF K 10V X5R 0805 (RoHS)	1
201	C415	B3D	3101051200020	Chip Capacitor 12PF J 50V COG 0402 (RoHS)	1
202	C439	B3D	3101051200020	Chip Capacitor 12PF J 50V COG 0402 (RoHS)	1
203	C410	B3D	3101051500020	Chip Capacitor 15PF J 50V COG 0402 (RoHS)	1
204	C414	B3D	3101051500020	Chip Capacitor 15PF J 50V COG 0402 (RoHS)	1
205	C409	B3E	3101051800010	Chip Capacitor 18PF J 50V C0G 0402 (RoHS)	1
206	C321	T5E	3101071050020	Chip Capacitor 1UF K 16V X5R 0805 (RoHS)	1
207	C125	B1H	3101061050020	Chip Capacitor 1UF K 25V X5R 0603 (RoHS)	1
208	C609	T2G	3101061050020	Chip Capacitor 1UF K 25V X5R 0603 (RoHS)	1
209	C621	T3F	3101061050020	Chip Capacitor 1UF K 25V X5R 0603 (RoHS)	1
210	C643	B2F	3101061050020	Chip Capacitor 1UF K 25V X5R 0603 (RoHS)	1
211	C668	B5G	3101061050020	Chip Capacitor 1UF K 25V X5R 0603 (RoHS)	1
212	C108	B2H	3101051050000	Chip Capacitor 1UF K 6.3V X5R 0402 (RoHS)	1
213	C115	B2G	3101051050000	Chip Capacitor 1UF K 6.3V X5R 0402 (RoHS)	1
214	C218	T3E	3101051050000	Chip Capacitor 1UF K 6.3V X5R 0402 (RoHS)	1
215	C628	T4J	3101051050000	Chip Capacitor 1UF K 6.3V X5R 0402 (RoHS)	1
216	C675	B5G	3101051050000	Chip Capacitor 1UF K 6.3V X5R 0402 (RoHS)	1
217	C124	B1H	3101062250000	Chip Capacitor 2.2UF K 10V X5R 0603 (RoHS)	1

No.	Ref No.	Print No.	Part No.	Description	Qty.
218	C631	B3F	3101062250000	Chip Capacitor 2.2UF K 10V X5R 0603 (RoHS)	1
219	C431	B2A	3101062490000	Chip Capacitor 2.4PF B 50V C0G 0603 (RoHS)	1
220	C526	B1F	3101052790060	Chip Capacitor 2.7PF B 50V COG HQ 0402 (RoHS)	1
221	C425	B2B	3101062210000	Chip Capacitor 220PF J 50V COG 0603 (RoHS)	1
222	C427	B3A	3101062210000	Chip Capacitor 220PF J 50V COG 0603 (RoHS)	1
223	C638	B3I	3101052200010	Chip Capacitor 22PF J 50V C0G 0402 (RoHS)	1
224	C639	B3J	3101052200010	Chip Capacitor 22PF J 50V C0G 0402 (RoHS)	1
225	C669	B5G	3101052200010	Chip Capacitor 22PF J 50V C0G 0402 (RoHS)	1
226	C329	T4F	3101102260010	Chip Capacitor 22uF Z 10V Y5V 1206 (RoHS)	1
227	C416	B3C	3101062710000	Chip Capacitor 270PF J 50V C0G 0603 (RoHS)	1
228	C515	B1F	3101050200010	Chip Capacitor 2PF B 50V C0G 0402 (RoHS)	1
229	C423	B3B	3101060200010	Chip Capacitor 2PF B 50V C0G 0603 (RoHS)	1
230	C434	B1A	3101060200010	Chip Capacitor 2PF B 50V C0G 0603 (RoHS)	1
231	C430	B2A	3101063690000	Chip Capacitor 3.6PF B 50V COG 0603 (RoHS)	1
232	C432	B2A	3101063690000	Chip Capacitor 3.6PF B 50V COG 0603 (RoHS)	1
233	C451	B4B	3101063000010	Chip Capacitor 30PF J 50V C0G 0603 (RoHS)	1
234	C428	B3A	3101060300010	Chip Capacitor 3PF B 50V C0G 0603 (RoHS)	1
235	C449	B2B	3101064590010	Chip Capacitor 4.5PF C 50V COG 0603 (RoHS)	1
236	C522	B1F	3101054790040	Chip Capacitor 4.7PF B 50V COG HQ 0402 (RoHS)	1
237	C523	B1F	3101054790040	Chip Capacitor 4.7PF B 50V COG HQ 0402 (RoHS)	1
238	C201	T2E	3101074750010	Chip Capacitor 4.7UF K 10V X5R 0805 (RoHS)	1
239	C641	T2I	3101074750010	Chip Capacitor 4.7UF K 10V X5R 0805 (RoHS)	1
240	C657	T3I	3101054720000	Chip Capacitor 4700PF K 50V X7R 0402 (RoHS)	1
241	C117	B2H	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
242	C118	B2H	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
243	C119	B2H	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
244	C121	B2H	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
245	C122	B2H	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
246	C128	B2G	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
247	C129	B2G	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
248	C131	B2G	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
249	C132	B2H	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
250	C133	B2H	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
251	C134	B1H	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
252	C209	T3E	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
253	C330	T4E	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
254	C332	T5E	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
255	C333	T2J	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
256	C406	B2E	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
257	C407	T2E	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
258	C408	B3E	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
259	C413	B3D	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
260	C424	B2C	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
261	C426	B2B	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1

No.	Ref No.	Print No.	Part No.	Description	Qty.
262	C440	B2B	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
263	C442	T2C	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
264	C443	T2D	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
265	C444	T2C	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
266	C445	T2D	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
267	C446	T2D	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
268	C447	T2D	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
269	C454	T2D	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
270	C456	B3E	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
271	C458	B3E	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
272	C524	B2F	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
273	C527	B2F	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
274	C622	T4J	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
275	C623	T2J	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
276	C624	T2J	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
277	C625	T2J	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
278	C626	T2J	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
279	C632	T2J	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
280	C633	T1E	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
281	C634	T2J	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
282	C635	T3I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
283	C644	T3I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
284	C646	T3B	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
285	C647	T3A	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
286	C648	B4A	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
287	C652	T4A	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
288	C653	T2I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
289	C654	T2I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
290	C656	T3F	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
291	C658	T2I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
292	C659	T2I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
293	C660	T2I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
294	C661	T2I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
295	C662	T2I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
296	C663	T2I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
297	C665	T2I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
298	C666	T2I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
299	C667	T2I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
300	C673	T4A	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
301	C674	T4A	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
302	C677	T3I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
303	C678	T3I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
304	C679	B4D	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
305	C680	B3F	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1

No.	Ref No.	Print No.	Part No.	Description	Qty.
306	C681	T4I	3101054710010	Chip Capacitor 470PF K 50V X7R 0402 (RoHS)	1
307	C517	B1F	3101050500010	Chip Capacitor 5PF B 50V COG 0402 (RoHS)	1
308	C520	B1F	3101050500010	Chip Capacitor 5PF B 50V COG 0402 (RoHS)	1
309	C450	B2B	3101060500010	Chip Capacitor 5PF B 50V COG 0603 (RoHS)	1
310	C513	B2E	3101056800000	Chip Capacitor 68PF J 50V COG 0402 (RoHS)	1
311	C688	T5B	3101056800000	Chip Capacitor 68PF J 50V COG 0402 (RoHS)	1
312	C404	B3E	3101050600010	Chip Capacitor 6PF B 50V COG 0402 (RoHS)	1
313	C502	B2D	3101050800000	Chip Capacitor 8PF B 50V COG 0402 (RoHS)	1
314	L411	B2B	3210107221000	Wire-wound chip inductor 220nH J 240mA 0.70ohm (RoHS)	1
315	L415	T1A	3210209102010	Wire-wound chip inductor 1uH M 445mA 0.5ohm (RoHS)	1
316	L406	B3D	3210305120000	Wire-wound chip inductor 1uH J 245mA 1.1Ω (RoHS)	1
317	L419	B3D	3210305150010	Multi-layer chip inductor 12nH J 300mA 0.28ohm (RoHS)	1
318	L418	B3E	3210305229010	Multi-layer chip inductor 15nH J 300mA 0.32ohm (RoHS)	1
319	R511	B1F	3210306101000	Multi-layer chip inductor 2.2nH S 300mA 0.12ohm (RoHS)	1
320	L506	B1F	3210306470000	Multi-layer chip inductor 100nH J 300mA 0.90ohm (RoHS)	1
321	L508	B1E	3212106120000	Multi-layer chip inductor 47nH J 300mA 0.70ohm (RoHS)	1
322	L509	B1F	3212106120000	Multi-layer chip inductor 12nH J 300mA 0.28ohm (RoHS)	1
323	L510	B1F	3213212102000	Multi-layer chip inductor 12nH J 300mA 0.28ohm (RoHS)	1
324	L101	B1H	3213306102000	Multi-layer chip inductor 1uH K 25mA 0.6Ω (RoHS)	1
325	L110	B2I	3213306102000	Multi-layer chip inductor 1uH K 25mA 0.6Ω (RoHS)	1
326	L107	T1J	3221506601000	Ferrite bead 600Ω 100MHz ±25% 500mA 0603 (RoHS)	1
327	L108	B1G	3221506601000	Ferrite bead 600Ω 100MHz ±25% 500mA 0603 (RoHS)	1
328	L111	T2G	3221506601000	Ferrite bead 600Ω 100MHz ±25% 500mA 0603 (RoHS)	1
329	L112	B2H	3221506601000	Ferrite bead 600Ω 100MHz ±25% 500mA 0603 (RoHS)	1
330	L402	B3E	3221506601000	Ferrite bead 600Ω 100MHz ±25% 500mA 0603 (RoHS)	1
331	L527	B2F	3221506601000	Ferrite bead 600Ω 100MHz ±25% 500mA 0603 (RoHS)	1
332	L603	T4J	3221506601000	Ferrite bead 600Ω 100MHz ±25% 500mA 0603 (RoHS)	1
333	L604	T2I	3221506601000	Ferrite bead 600Ω 100MHz ±25% 500mA 0603 (RoHS)	1
334	L407	B3D	3221507221000	Ferrite bead 220Ω 100MHz ±25% 2000mA 0805 (RoHS)	1
335	L410	B2B	3221507221000	Ferrite bead 220Ω 100MHz ±25% 2000mA 0805 (RoHS)	1
336	L608	T3F	3221507221000	Ferrite bead 220Ω 100MHz ±25% 2000mA 0805 (RoHS)	1
337	L412	B2A	3231351640000	Air-core inductor E2-0.35*1.6*4TL (RoHS)	1
338	L413	B2A	3231351640000	Air-core inductor E2-0.35*1.6*4TL (RoHS)	1
339	L414	B1A	3231351640000	Air-core inductor E2-0.35*1.6*4TL (RoHS)	1
340	L409	B2B	3231351680000	Air-core inductor E2-0.35*1.6*8TR (RoHS)	1
341	D655	B4D	3302030500020	Zener diode 150℃ SOD-323 (RoHS)	1
342	D656	B5G	3303030300000	Schottky diode 40V 30mA 0.26V/1mA (RoHS)	1
343	D502	B2D	3303990000060	Switching diode 35V 100mA 1V SOD-523 (RoHS)	1
344	D503	B2D	3303990000060	Switching diode 35V 100mA 1V SOD-523 (RoHS)	1
345	D401	B2B	3305180300000	Diode 100mA max 1Ω SOD-323 (RoHS)	1
346	D602	T2A	3307110100060	LED red 200mcd 30mA 1.9V1.6X0.8mm (RoHS)	1
347	D601	T3A	3307110100130	LED green 40mcd 30mA 2.1V 0603 (RoHS)	1
348	D505	B2D	3399990000260	Rectifier diode 10V 15mA 380mV/1mA MPAK (RoHS)	1
349	Q605	T4A	3403009000010	Transistor NPN*2 50V -100mA 250 SC-88A (RoHS)	1

No.	Ref No.	Print No.	Part No.	Description	Qty.
350	Q404	T2D	3403999000000	Transistor PNP+NPN -50V/50V -100mA/100mA 80/80 (RoHS)	1
351	Q502	B2F	3403999000000	Transistor PNP+NPN -50V/50V -100mA/100mA 80/80 (RoHS)	1
352	Q407	B2E	3408002000000	NPN transistor 12V 100mA 120 1GHz SMD (RoHS)	1
353	Q501	B1E	3408002000000	NPN transistor 12V 100mA 120 1GHz SMD (RoHS)	1
354	Q201	B5G	3411001000000	PNP transistor 50V 150mA 70~700 SOT-523 (RoHS)	1
355	Q303	T4E	3499000000180	PNP transistor 12V 2.5A 180~270 SOT23 (RoHS)	1
356	Q302	T4E	3403008000010	Transistor Vce:50V VIoff:0.5V VIon:3V 100mA (RoHS)	1
357	Q406	T2E	3403008000010	Transistor Vce:50V VIoff:0.5V VIon:3V 100mA (RoHS)	1
358	Q408	B3E	3403008000010	Transistor Vce:50V VIoff:0.5V VIon:3V 100mA (RoHS)	1
359	Q202	T3E	3503020000030	N-MOSFET VDS:30V ID:100mA VGS(th):3.0V SC-75 (RoHS)	1
360	Q409	B3E	3504990000010	P-MOSFET VDS:-30V ID:-100mA VGS(th):-1.9V SC-75 (RoHS)	1
361	Q402	B3D	3504990000040	PA MOSFET VDS:30V ID:600mA VGS(th):1.8V 1.4W (RoHS)	1
362	Q403	B3C	3605008005070	PA MOSFET 10uA 25V 10uA 7.2V 7W (RoHS)	1
363	U401	T2D	3605008005070	Operational amplifier 3~32V 300mW 100dB 2 (RoHS)	1
364	U613	B5G	3605017005540	Operational amplifier 3~32V 300mW 100dB 2 (RoHS)	1
365	U302	T5F	3608015000060	Operational amplifier 1.8~15V 220mW 39dB (RoHS)	1
366	U619	B3F	3608015000210	Power management IC LDO 5V 300mA (RoHS)	1
367	U621	T3G	3609042000020	Power management IC LDO 12V 3.3V 300mA (RoHS)	1
368	U622	T3I	3612031000510	MCU 8 2.8~5V 20MHZ -40~+85 LQFP 64 (RoHS)	1
369	U603	T4J	3613999000020	Memory EEPROM 16KB 1.7~5.5V (RoHS)	1
370	U101	B2H	3701327610060	Baseband IC 3.3V -25~85 5dBm -124dBm (RoHS)	1
371	X601	B4I	3210306229000	Crystal 32.768KHz ±20ppm 12.5pF (RoHS)	1
372	L408	B3D	3210306229000	Multi-layer chip inductor 2.2nH S 500mA 0.10ohm (RoHS)	1
373	L417	B3C	3210305220000	Multi-layer chip inductor 2.2nH S 500mA 0.10ohm (RoHS)	1
374	L511	B1F	3231301340000	Multi-layer chip inductor 0402 22nH (RoHS)	1
375	L501	B1D	3231301340000	Air-core inductor 0.3*1.3*4TR (RoHS)	1
376	L502	B2B	3503010000010	Air-core inductor 0.3*1.3*4TR (RoHS)	1
377	XT101	B1I	3701002660130	TCXO 26MHz 3.135V~3.465V ±2.5ppm 3225 (RoHS)	1
378	D303	T5A	3399040600020	ESD protection diode VRWM:12V IPP:5A/10us (RoHS)	1
379	D403	B2C	3310990000160	ESD protection diode 10 5A/ 8/20uS -40~+85 (RoHS)	1
380	D610	T2G	3310990000160	ESD protection diode 10 5A/ 8/20uS -40~+85 (RoHS)	1
381	D613	B4A	3310990000160	ESD protection diode 10 5A/ 8/20uS -40~+85 (RoHS)	1
382	D657	T5A	3310990000160	ESD protection diode 10 5A/ 8/20uS -40~+85 (RoHS)	1
383	D658	B4D	3310990000160	ESD protection diode 10 5A/ 8/20uS -40~+85 (RoHS)	1
384	D663	B1H	3310990000160	ESD protection diode 10 5A/ 8/20uS -40~+85 (RoHS)	1
385	D664	B1H	3310990000160	ESD protection diode 10 5A/ 8/20uS -40~+85 (RoHS)	1
386	/	/		Main PCB IT158 4L 4P 217.25*111.40*1.0 (RoHS)	1

7. Tuning Description

7.1 Required Test Instruments

- Radio communication test set (HP8921) 1 set
- 10V/3A regulated DC power supply 1 set
- Digital voltmeter 1 set
- Ammeter 1 set

7.2 Preparations

Place the board to be tested on the test fixture (please ensure good connection between each test point and the fixture), and connect the board to a power supply with DC voltage of 6.0V.

7.3 Wired Clone

7.3.1 Instructions:

- Connect two radios using a cloning cable. Simultaneously hold **MONI** key to power on the source radio so that the wired clone mode will be entered after 2 seconds, and then press **MONI** key to switch to factory wired clone mode (when the wired clone mode is entered, the user wired clone mode is defaulted); then directly power on the target radio to enter the user mode.
- The LED flashes red once after the source radio enters Wired Clone mode. Press **PTT** to clone data to the target radio.
- During communication, the LED of the source radio glows red, and the LED of the target radio glows green. When the communication ends, green LED of the source radio glows and the green LED of the target radio goes out, which indicates the preparation for another clone.
- If any abnormal situation occurs during communication, the source radio will flash orange LED and will stop communication for another cloning.
- When cloning ends, the source radio goes back to the standby status. Press **PTT** again to begin another cloning operation.

7.3.2 LED Indication during Cloning

- Orange LED flashes: an error occurs during cloning. In this case, press any key other than the power switch to turn it off.
- Green LED glows: the cloning is done successfully.

7.3.3 Difference between Factory Clone Mode and Clone Mode

- Clone Mode: Only clone relevant data in user mode (such as frequencies). Tuning parameters like tuning frequency, tuning item and base band parameter will not be cloned.
- Factory Clone Mode: Clone all the data excluding serial No.

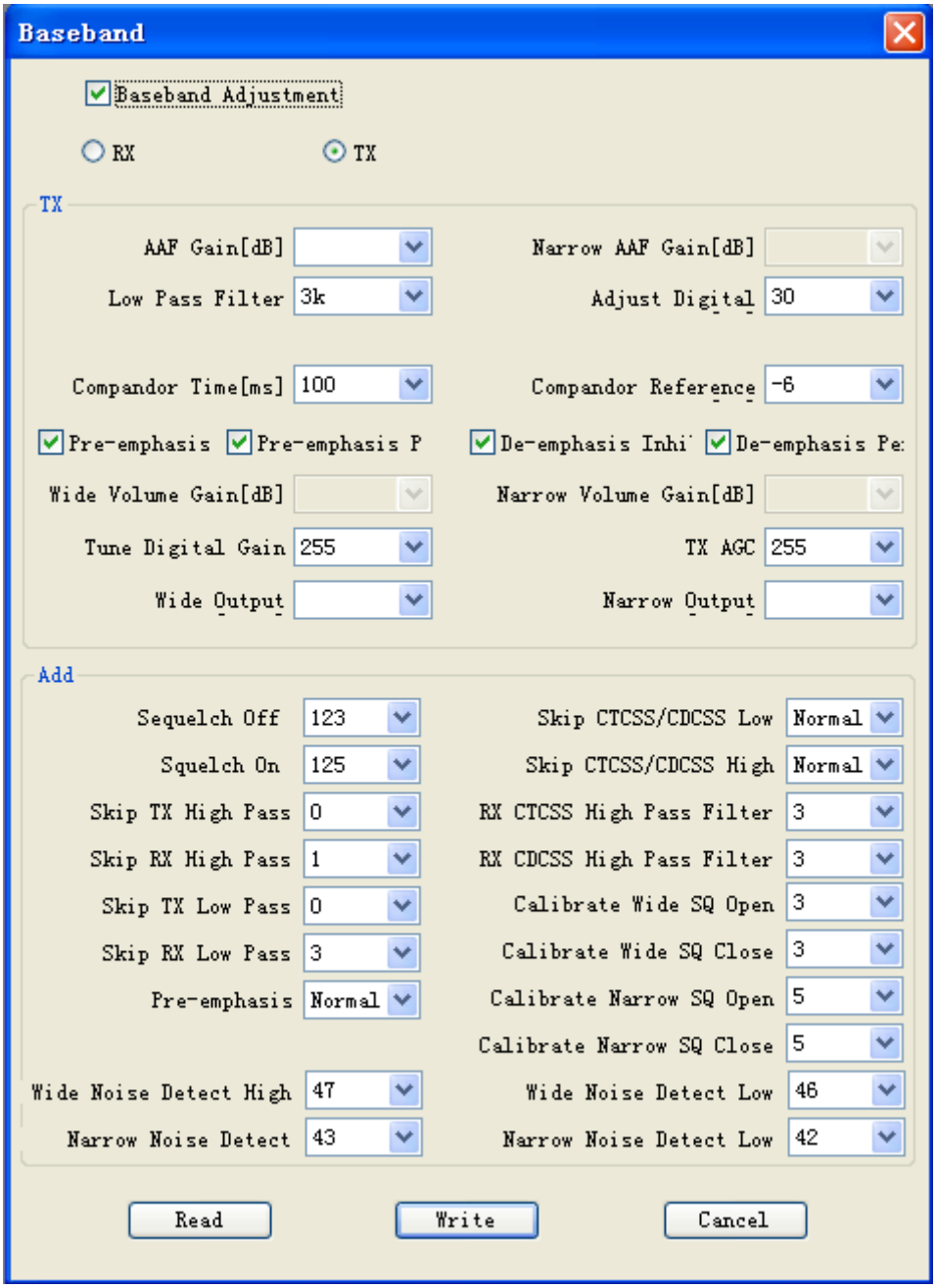
7.4 Description of Tuning Items

Channel	Tunable Frequency	Wide Band					Narrow Band				
		Freq . 1	Freq . 2	Freq . 3	Freq . 4	Freq . 5	Freq . 1	Freq . 2	Freq . 3	Freq . 4	Freq . 5
TX Circuit											
1	Freq. Tolerance	/	/	Y	/	/	/	/	/	/	/
2	TX Low Power	Y	Y	Y	Y	Y	/	/	/	/	/
3	TX High Power	Y	Y	Y	Y	Y	/	/	/	/	/
5	CDCSS Deviation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6	CTCSS Deviation (low)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7	CTCSS Deviation (medium)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8	CTCSS Deviation (high)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
10	TX Low Voltage Threshold	/	/	Y	/	/	/	/	/	/	/
11	Max. TX Audio Deviation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
RX Circuit											
1	RX Low Voltage Threshold	/	/	Y	/	/	/	/	/	/	/
2	Max. RX Audio Power	/	/	Y	/	/	/	/	/	/	/

Note:

Y indicates frequencies available for tuning, and the rest are blank channels without tuning items.

7.5 Baseband Design



Description:

- Squelch On/Off: to set the threshold value for enabling/disabling the squelch function.
- Calibrate Wide/Narrow SQ Open/Close: to tune the squelch threshold to compensate the circuit difference. It is recommended to apply the same value to one model. Increasing the value may tighten the squelch, while decreasing may loosen it.

- Skip RX/TX High/Low Pass: to configure the audio filter (0: not skip; 1: to skip one filter; 2: to skip the other filter; 3: to skip two filters).
- Pre-emphasis: to configure the pre-emphasis function.
- Skip CTCSS/CDCSS High/Low: to set whether to skip CTCSS/CDCSS filter.
- RX CTCSS/CDCSS High Pass Filter: to configure the parameters of CTCSS/CDCSS filter.
- Wide/Narrow Noise Detect High/Low: to configure the noise detection threshold.

7.6 Method and Procedure:

7.6.1 Description of Tuning Procedures

Simultaneously hold **PTT**, **MONI** and **Power On/Off Key** for more than 2s to enter tuning mode (LED flashes orange). After the keys are released, the radio will enter the tuning item in this mode (the item entered depends on the position where the **Channel Selector** knob locates). And the LED will glow red or green according to the specific tuning item.

Or connect a programming cable to the radio for real-time tuning in PC Programming Mode.

7.6.2 Description of Tuning Items

You can use MONI key to select your desired values.

7.6.3 Specific Operations and Requirements

Note:

- By default, channel 1, 2, 3, 4 and 5 use wide band, while channel 6, 7, 8, 9 and 10 use narrow band. Remember to connect the antenna properly.
- Press **PTT**+**MONI** key to turn on the radio.

Tuning Items for TX

Item	Condition	Measurement		Tuning		Specifications / Remarks
		Test Instrume-nt	Test Point	Comp-onent	Method	
Freq. Tolerance	Rotate the **Channel Selector** knob to channel 1.	Communi cation test set	Antenna connector	Press **MONI** key	Press **MONI** key to adjust the value. Then save your change and go to another	＜150Hz

Item		Condition	Measurement		Tuning		Specifications / Remarks
			Test Instrume-nt	Test Point	Comp-onent	Method	
						channel.	
TX Power	Low	Rotate the **Channel Selector** knob to channel 2.	Communi-cation Test Set / Ammeter	Antenna connector	Press **MONI** key	Press **MONI** key to adjust the value. Then save your change and go to another channel.	UHF: 2.0W±0.3W I≤1.1A
		Short press **PTT** to switch the frequency under test.					
	High	Rotate the **Channel Selector** knob to channel 3.				Press **MONI** key to adjust the value. Then save your change and go to another channel.	3.3W±0.2W I≤1.45A
		Short press **PTT** to switch the frequency under test.					
CDCSS Deviat-ion	Wide Band	Rotate the **Channel Selector** knob to channel 4.	Communi-cation test set BPF: <20～300Hz AF Genl Lvl: off	Antenna connector	Press **MONI** key	Press **MONI** key to adjust the value. Then save your change and go to another channel.	650±50Hz
		Short press **PTT** to switch the frequency under test.					
	Narrow Band	Following wideband test, long press **PTT** to perform					400±50Hz

Item		Condition	Measurement		Tuning		Specifications / Remarks
			Test Instrume-nt	Test Point	Comp-onent	Method	
		narrow band test.					
		Short press **PTT** to switch the frequency under test.					
CTCSS Deviation	Low	Rotate the **Channel Selector** knob to channel 5. Short press **PTT** to switch the frequency.	Communi-cation Test Set BPF: <20~300Hz AF Genl Lvl: off	Antenna connector	Press **MONI** key	Press **MONI** key to adjust the value. Then save your change and go to another channel.	Wide band: 675±50Hz Narrow band: 400±50Hz
		Following wideband test, long press **PTT** to perform narrow band test.					
	Medium	Rotate the **Channel Selector** knob to channel 6. Short press **PTT** to switch the frequency.					
		Following wideband test, long press **PTT** to perform					

Item		Condition	Measurement		Tuning		Specifications / Remarks
			Test Instrume-nt	Test Point	Comp-onent	Method	
		narrow band test.					
	High	Rotate the **Channel Selector** knob to channel 7. Short press **PTT** to switch the frequency.					
		Following wideband test, long press **PTT** to perform narrow band test.					
TX Low Voltage Threshold		Rotate the **Channel Selector** knob to channel 8.	Digital voltmeter	Power Supply Port	Power Suppl-y	Adjust the power supply to 5.3V and press **MONI** key to sample it. Then save your change and go to another channel.	In case of ≤5.3V±0.15V, TX is inhibited.
Max. TX Audio Deviat-ion	Wide Band	Rotate the **Channel Selector** knob to channel 9.	Communi-cation Test Set BPF:	Antenna Earpiece Jack	Press **MONI** key	Press **MONI** key to adjust the value. Then save	4.3KHz~4.5K Hz

Item		Condition	Measurement		Tuning		Specifications / Remarks
			Test Instrume-nt	Test Point	Comp-onent	Method	
		Short press **PTT** to switch the frequency.	<20~15K Hz AF Genl Lvl: 120mV			your change and go to another channel.	
	Narrow Band	Following wideband test, long press **PTT** to perform narrow band test.					2.1KHz～2.3KHz

Note:

Note: Make sure that the antenna or load is connected before tuning; rotating the **Channel Selector** knob will save the value automatically.

RX Tuning Items

Item	Condition	Measurement		Tuning		Specifications / Remarks
		Test Instrument	Test Point	Compo-nent	Method	
RX Low Voltage Threshold	Rotate the **Channel Selector** to channel 10.	Digital voltmeter	Power Supply Interface	Power Supply	Adjust the power supply to 5.6V and press **MONI** key to sample it. Then save your change and go to another channel.	5.6V±0.1V: the red LED flashes and alert tone sounds.

Item	Condition	Measurement		Tuning		Specifications / Remarks
		Test Instrument	Test Point	Compo-nent	Method	
Max. RX Audio Power	Rotate the **Channel Selector** knob to channel 11.	Communication Test Set SSG: -47dBm MOD: 1KHz DEV: 3KHz Filter: 0.3～3KHz	Antenna Earpiece Socket	Press **MONI** key	Press **MONI** key to adjust the value. Then save your change and go to another channel.	(W/N): 0.6~1W

7.7 Appendix 1:

Appendix 1: Reference Value for Source Radio

Item	Wide Band					Narrow Band				
	Freq. 1	Freq. 2	Freq. 3	Freq. 4	Freq. 5	Freq. 1	Freq. 2	Freq. 3	Freq. 4	Freq. 5
Tx Item Section										
Freq. Tolerance	/	/	121	/	/	/	/	/	/	/
TX Low Power	72	74	77	78	83	/	/	/	/	/
TX High Power	117	120	125	127	121	/	/	/	/	/
CDCSS Deviation	18	18	18	18	18	22	22	22	22	22
CTCSS Deviation (low)	25	25	25	25	25	29	29	29	29	29
CTCSS Deviation (medium)	25	25	25	25	25	29	29	29	29	29
CTCSS Deviation (high)	25	25	25	25	25	29	29	29	29	29
TX Low Voltage	/	/	126	/	/	/	/	/	/	/

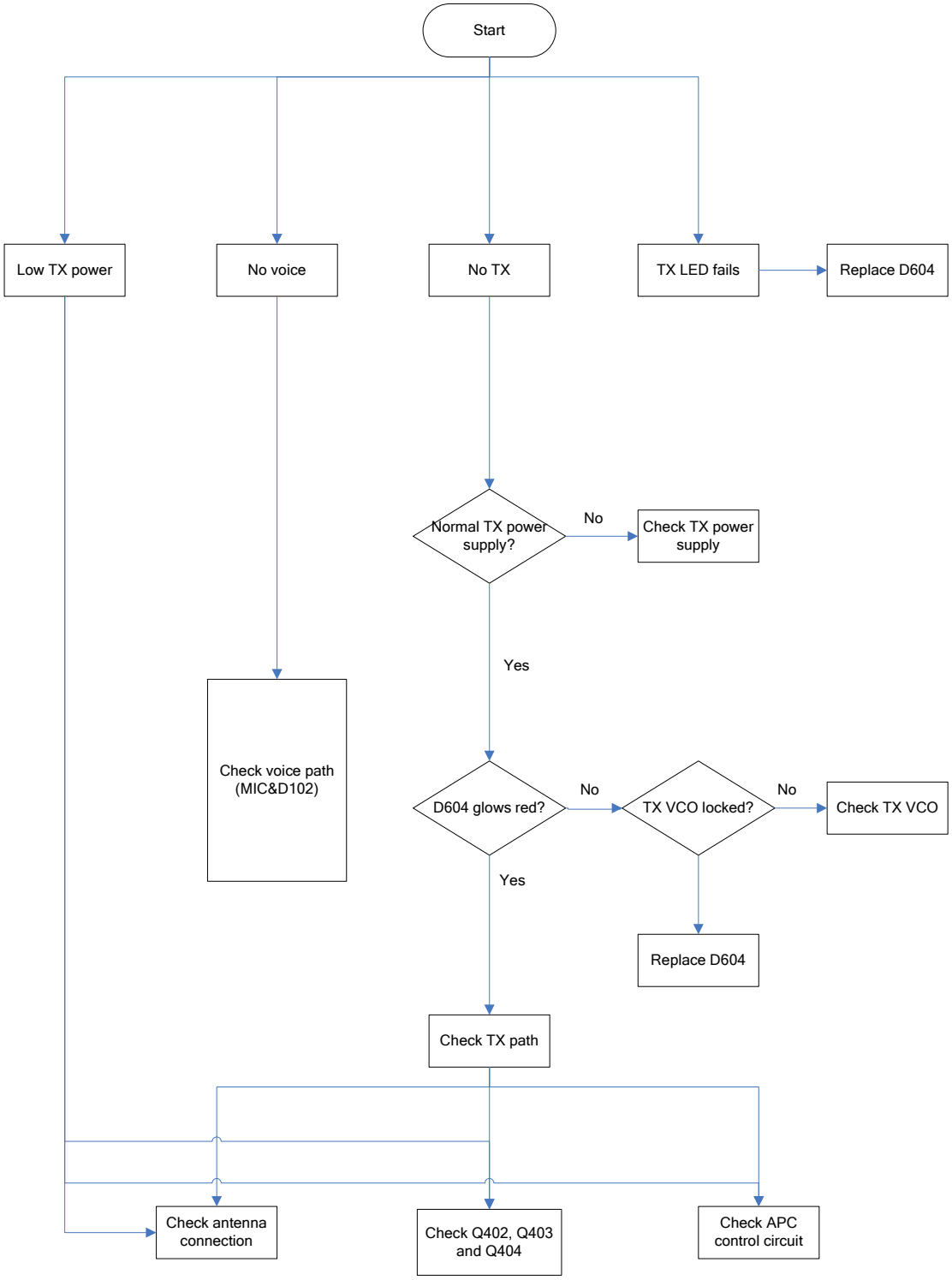
Item	Wide Band					Narrow Band				
	Freq. 1	Freq. 2	Freq. 3	Freq. 4	Freq. 5	Freq. 1	Freq. 2	Freq. 3	Freq. 4	Freq. 5
Threshold										
Max. TX Audio Deviation	49	49	49	49	49	49	49	49	49	49
Rx Item Section										
RX Low Voltage Threshold	/	/	135	/	/	/	/	/	/	/
Max. RX Audio Power	/	/	218	/	/	/	/	/	/	/

Note:

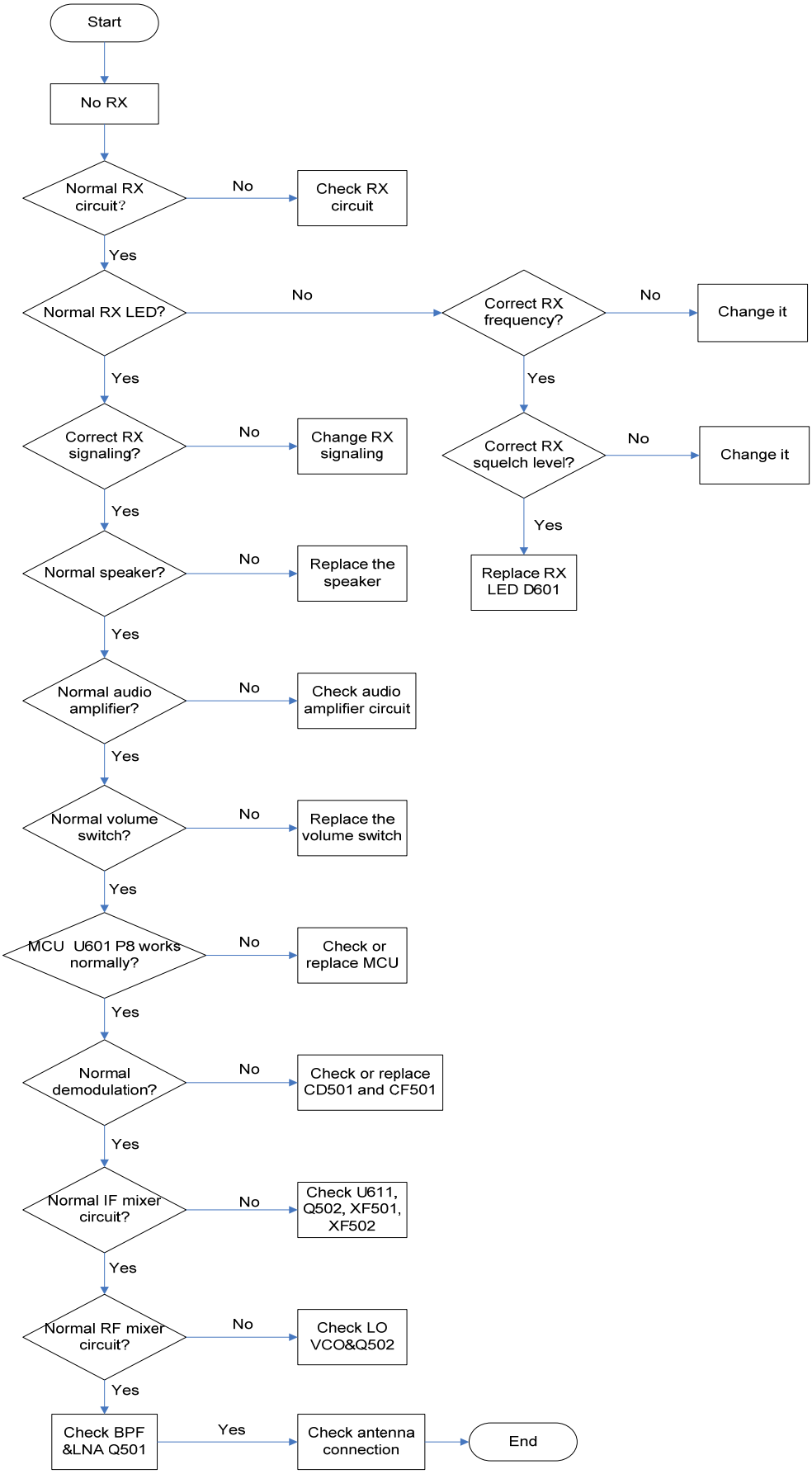
The value is subject to that of the source radio.

8. Troubleshooting Flow Chart

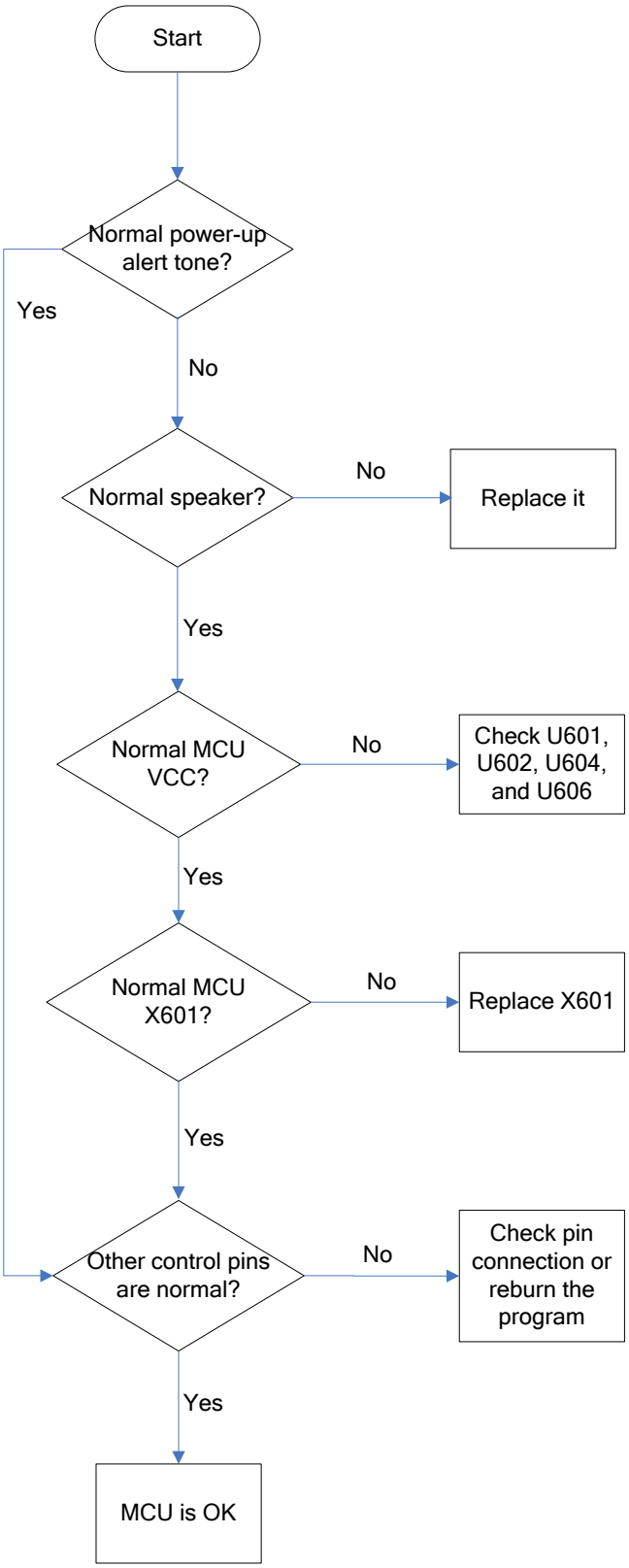
TX Circuit



RX Circuit


Start
No RX
Normal RX circuit?
No
Check RX circuit
Yes
Normal RX LED?
No
Correct RX frequency?
No
Change it
Yes
Yes
Correct RX signaling?
No
Change RX signaling
Correct RX squelch level?
No
Change it
Yes
Yes
Normal speaker?
No
Replace the speaker
Replace RX LED D601
Yes
Normal audio amplifier?
No
Check audio amplifier circuit
Yes
Normal volume switch?
No
Replace the volume switch
Yes
MCU U601 P8 works normally?
No
Check or replace MCU
Yes
Normal demodulation?
No
Check or replace CD501 and CF501
Yes
Normal IF mixer circuit?
No
Check U611, Q502, XF501, XF502
Yes
Normal RF mixer circuit?
No
Check LO VCO&Q502
Yes
Check BPF &LNA Q501
Yes
Check antenna connection
End

MCU


Start
Normal power-up alert tone?
Yes
No
Normal speaker?
No
Replace it
Yes
Normal MCU VCC?
No
Check U601, U602, U604, and U606
Yes
Normal MCU X601?
No
Replace X601
Yes
Other control pins are normal?
No
Check pin connection or reburn the program
Yes
MCU is OK

9. Disassembly and Assembly

9.1 Removing the Battery

To remove the battery, power off the radio first, push the battery latch upwards, and then take out the battery from the battery slot. See Figure 1.

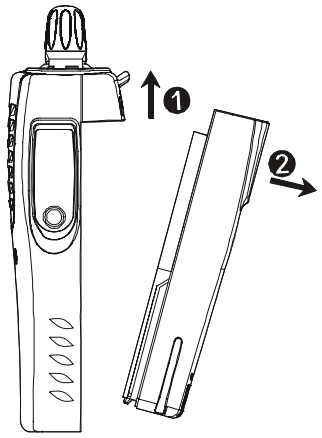


Figure 1

9.2 Removing the Aluminum Chassis and PCB Kit

Step 1 Unfasten the two screws at the bottom of the radio.

Step 2 Remove the Volume Control knob and Channel Selector knob.

Step 3 Remove the antenna at the top of the radio.

Step 4 Unfasten the screws for fastening MIC cover and remove the cover. See Figure 2.

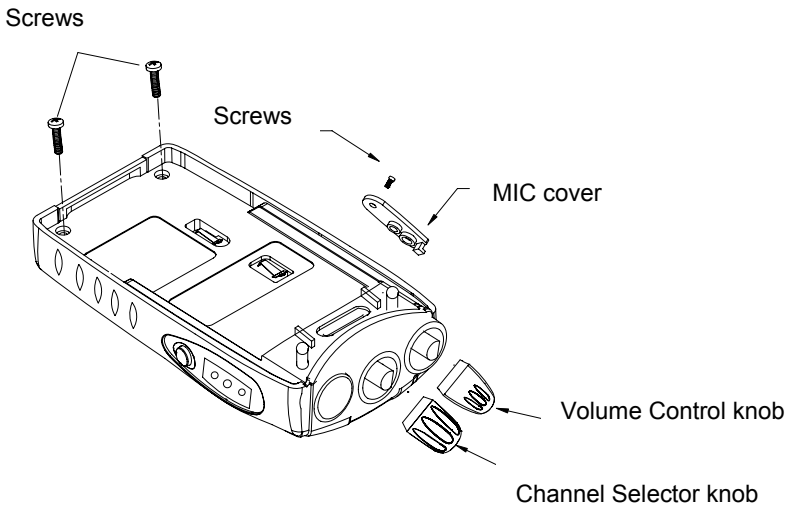


Figure 2

Step 5 Lift the bottom of the aluminum chassis, pull the aluminum chassis backwards and take it out. See Figure 3.

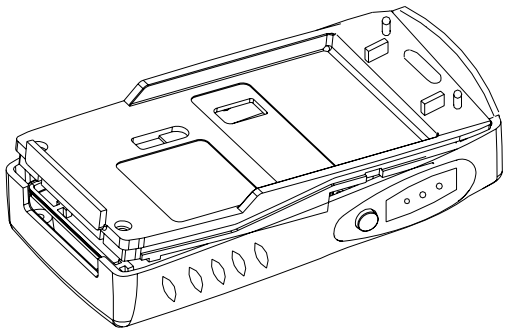


Figure 3

The disassembled parts are shown below:

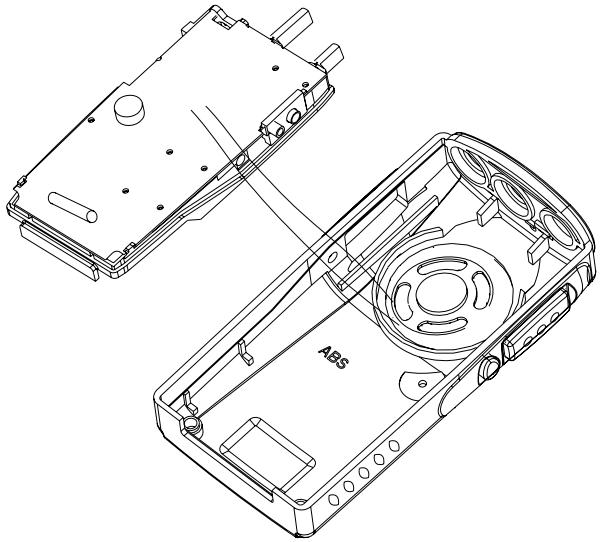


Figure 4

9.3 Removing the PTT Key

Push **PTT** key from outer side of the aluminum chassis. See Figure 5.

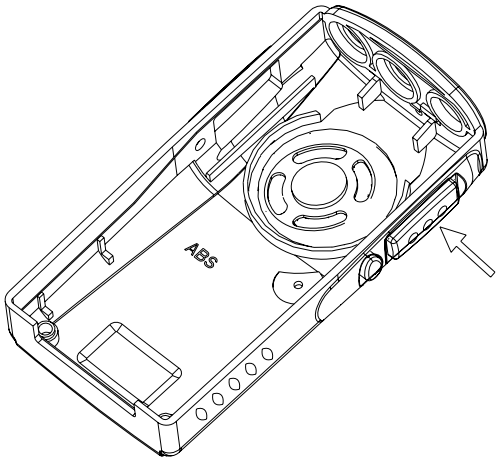


Figure 5

9.4 Assembling the PTT Key

Step 1 Apply double-sided tape to the front case.

Step 2 Install the PTT key into its place from the inner side of the chassis. See Figure 6.

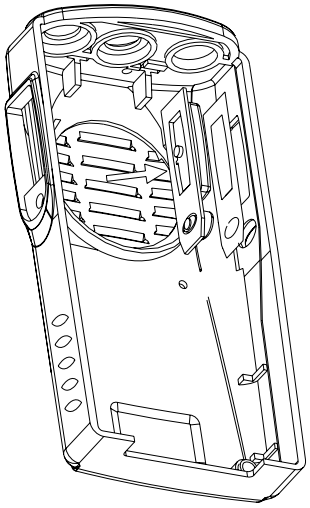


Figure 6

9.5 Assembling the Battery

Place the battery into the battery slot until a click is heard, as shown below:

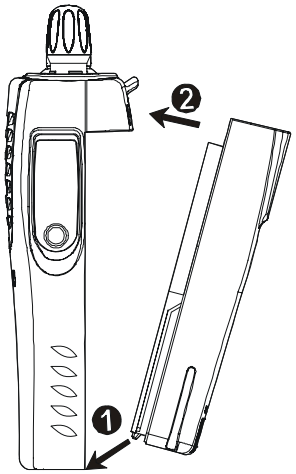
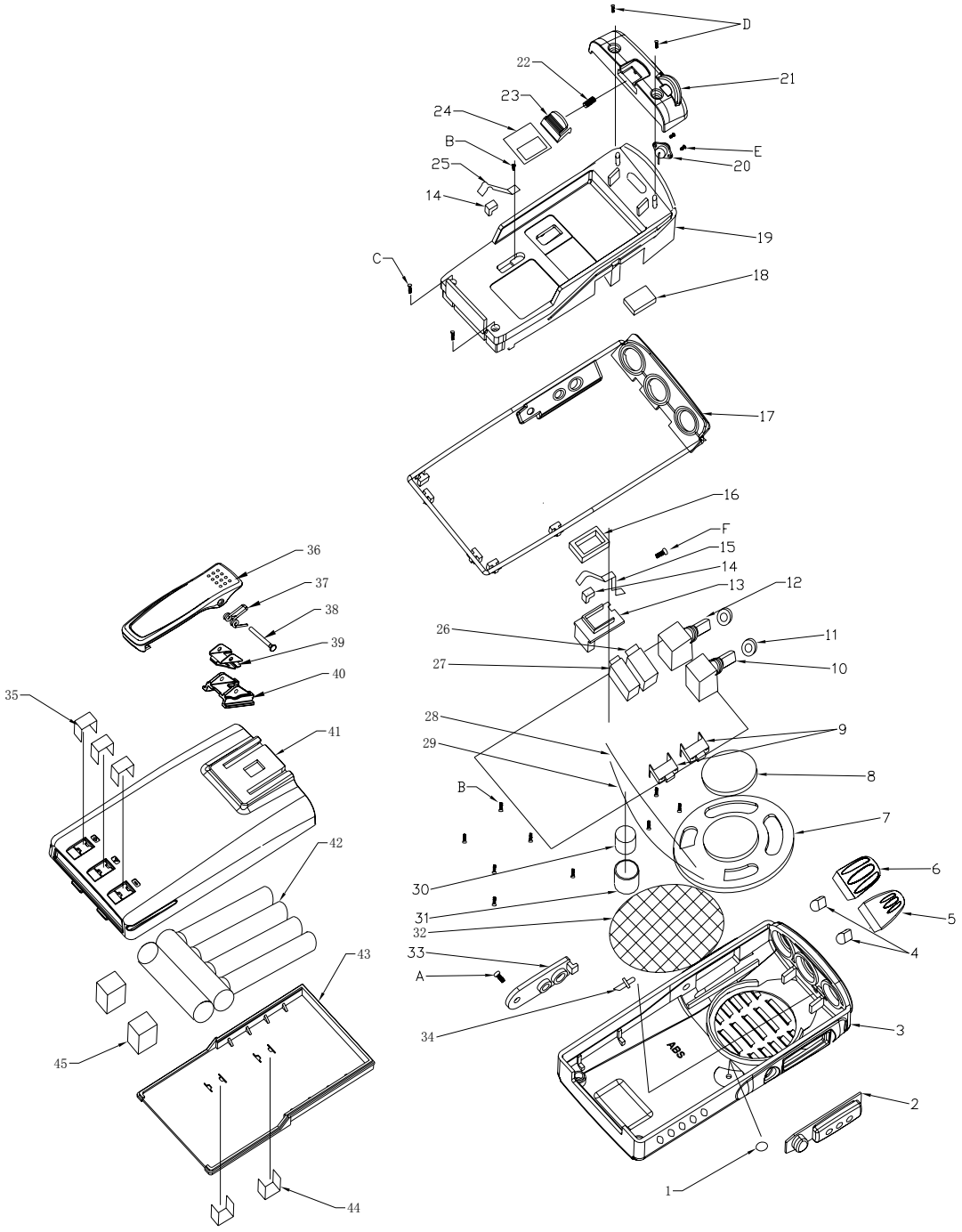


图 7

10. Exploded View



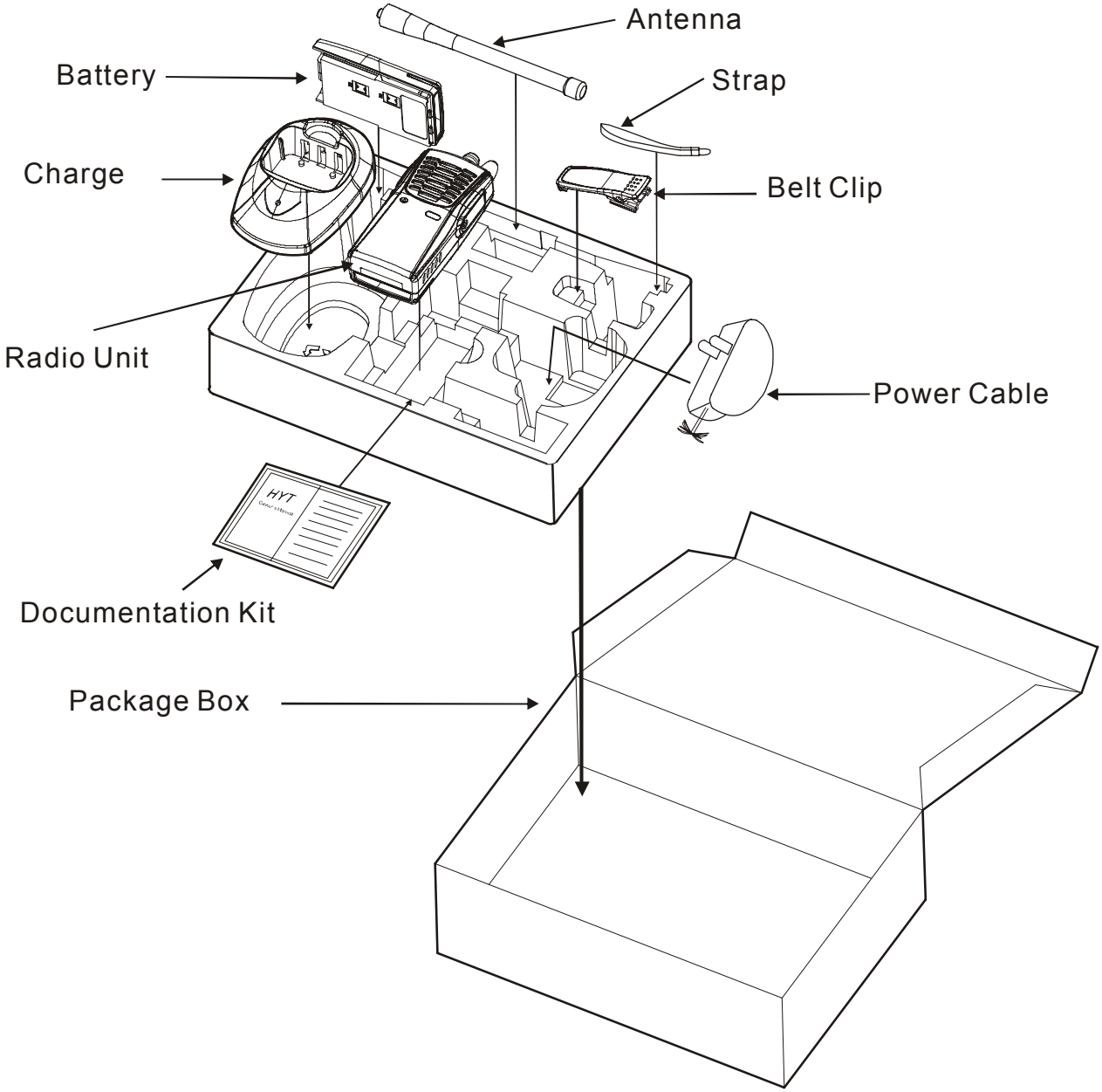
11. Parts List 2

No.	Part No.	Description	Qty.
A	7102507000000	Machine screw	1
B	7102004021030	Self-tapping screw	10
C	7102009001000	Machine screw	2
D	7102504000300	Machine screw	2
E	7102505000110	Machine screw	2
F	7102004020100	Self-tapping screw	1
1	7400077000000	MIC Net	1
2	6100030000020	PTT key	1
3	6000050100000	Front case	1
4	6201006000000	Inner lining for knob	2
5	6000158000040	Encoder knob	1
6	6000160000040	Volume control knob	1
7	5001010000020	Speaker	1
8	7400034000000	Insulation sheet for speaker	1
9	4301040000060	Momentary contact switch	2
10	4304030000010	Gray code rotary switch	1
11	7207002200200	Nut	2
12	4303020000030	Volume switch	1
13	6000046000000	Bracket for anode piece	1
14	7500115000000	Battery pad	2
15	6201030000000	Battery anode piece	1
16	7500195000000	Sponge for anode piece	1
17	6100034000000	Waterproof ring	1
18	7500114000000	Heat sink pad	1

No.	Part No.	Description	Qty.
19	6300052000000	Aluminum chassis	1
20	4400100008000	SMA RF connector	1
21	6000051000030	Rear cover	1
22	7000139000000	Spring of latch	1
23	6000039000000	Battery latch	1
24	7400014010020	Waterproof PC sheet	1
25	6201022000000	Battery cathode piece	1
26	5205000000280	Socket	1
27	5205000000190	Socket	1
28	4210060000000	Lead	1
29	4210060000100	Lead	1
30	5002230000000	MIC	1
31	6100075000000	MIC washer	1
32	7400075000000	Speaker felt	1
33	6000054000000	MIC cover	1
34	6000189000000	Light guide	1
35	6201503000000	Charging Piece	3
36	6000154100030	Belt clip	1
37	7000018000130	Belt clip spring	1
38	7000124000000	Shaft for belt clip	1
39	6201035000110	Belt clip spring	1
40	6300010000000	Metal bracket for belt clip	1
41	6000052000080	Front case of battery	1
42	5511100050000	Ni-MH battery core	1
43	6000053000020	Bottom case of battery	1

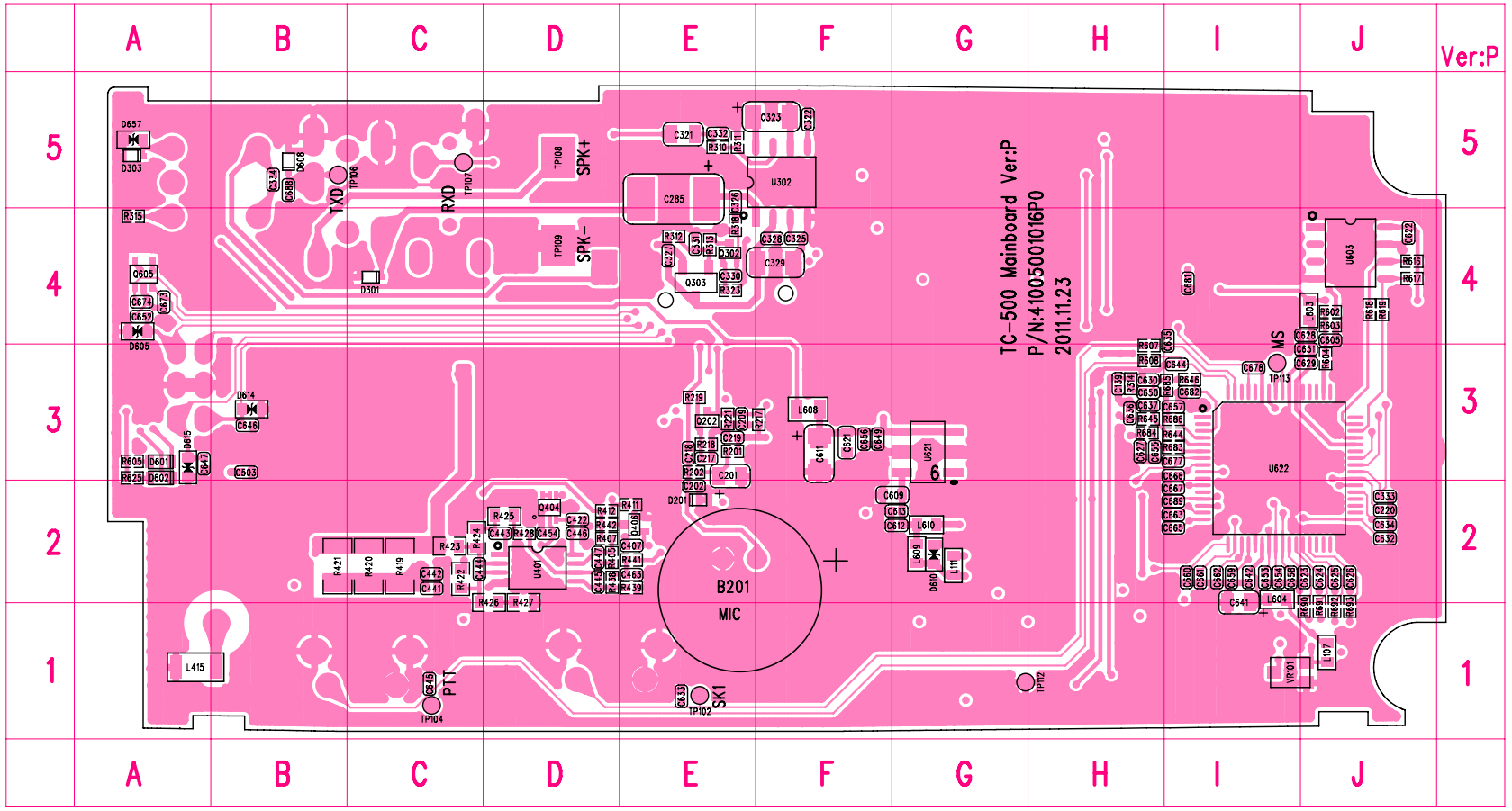
No.	Part No.	Description	Qty.
44	6201738000000	Battery anode and cathode piece	2
45	7500154000000	Sponge pad of battery	2

12. Packing Guide

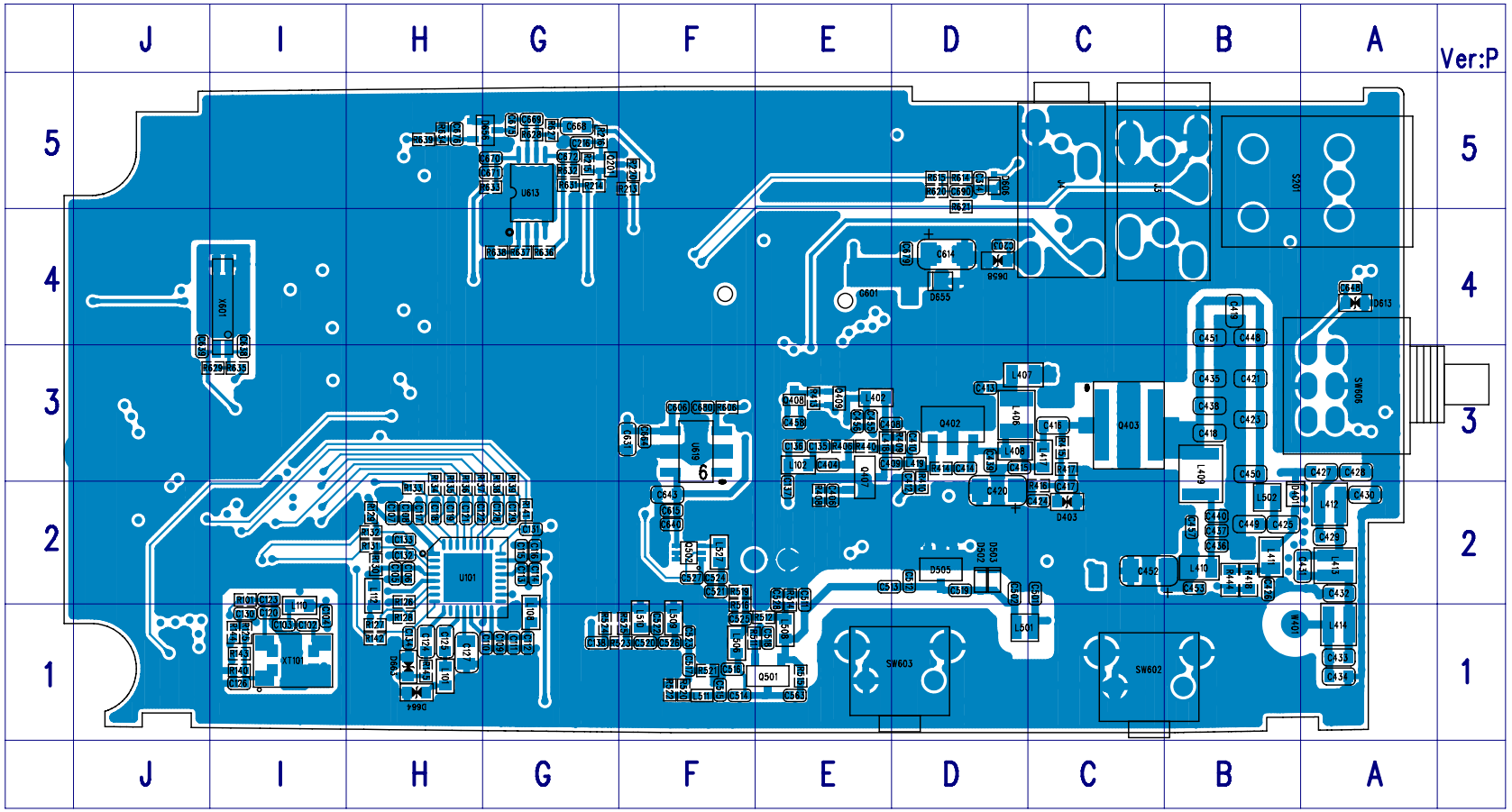


13. PCB View

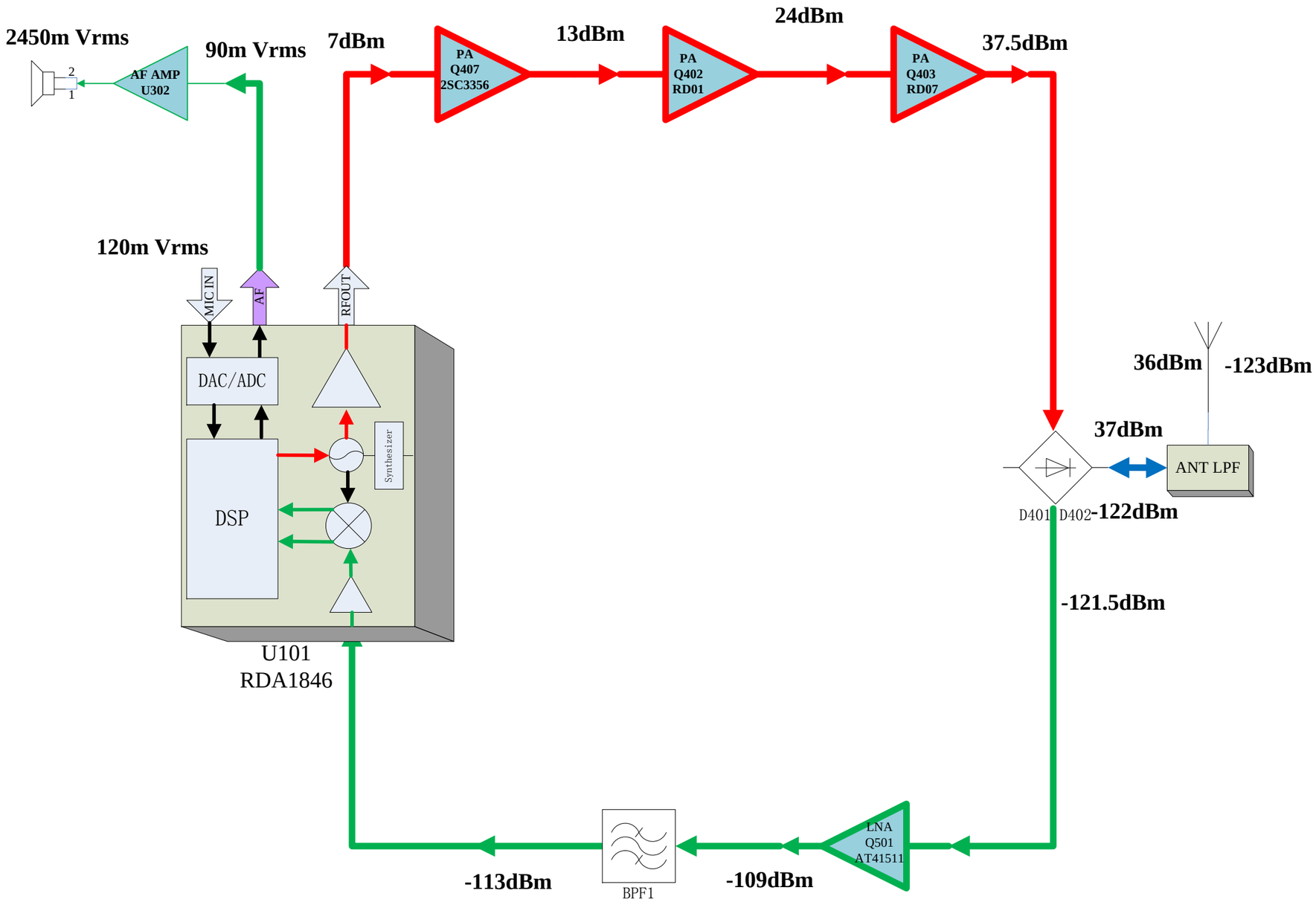
PCB View
Top Layer



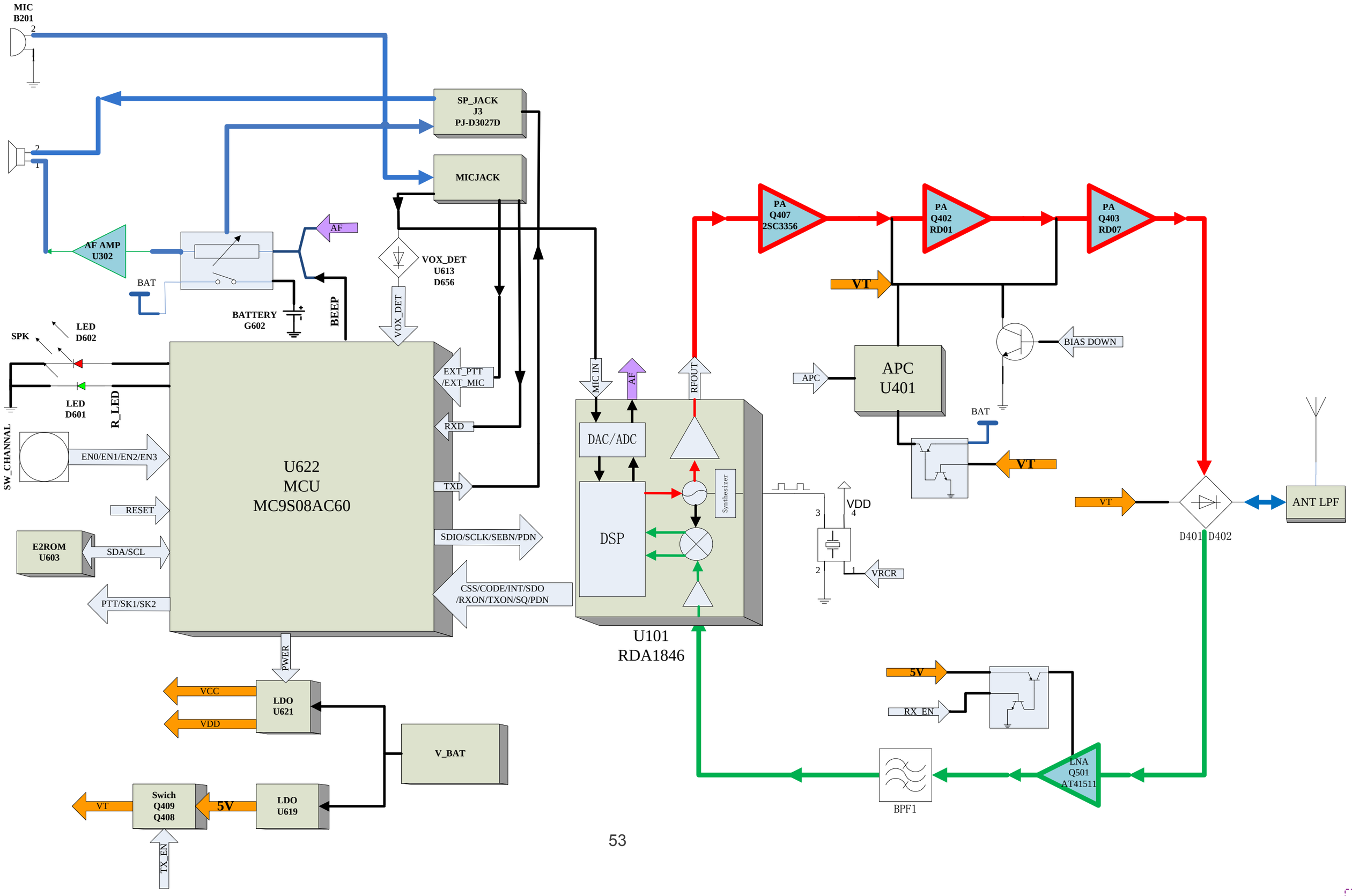
PCB View
Bottom Layer



14. Level Diagram

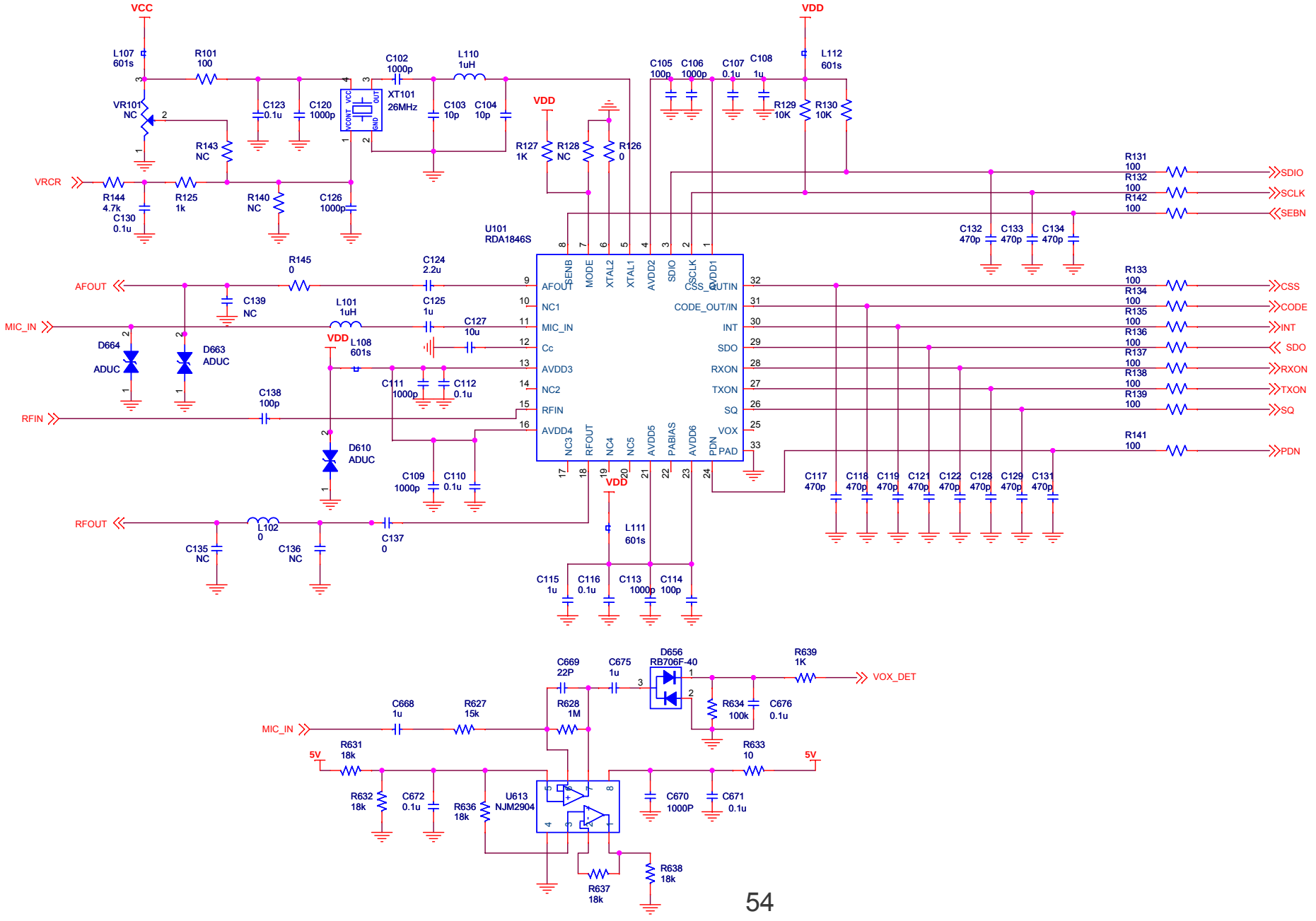


15. Block Diagram

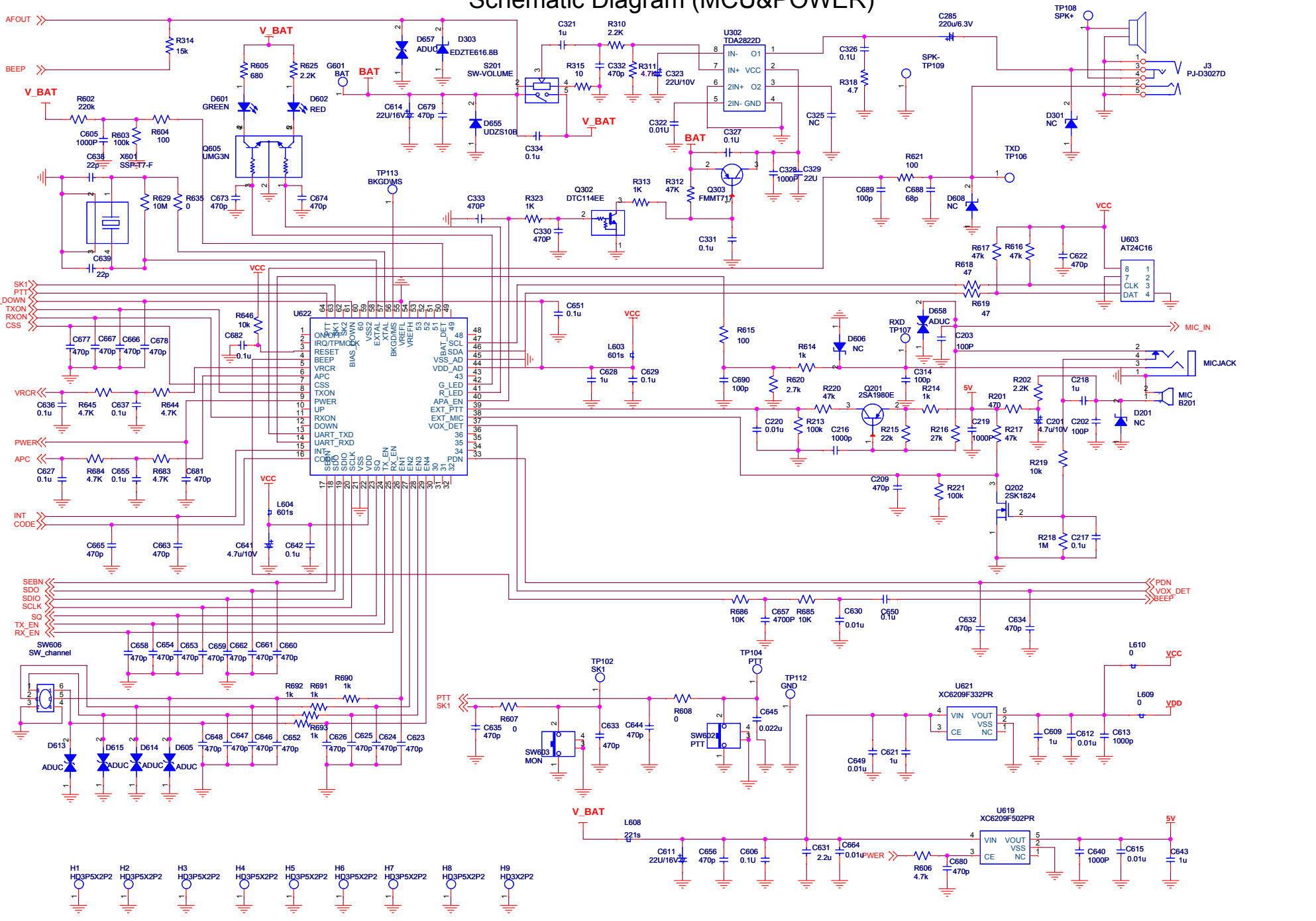


16. Schematic Diagram

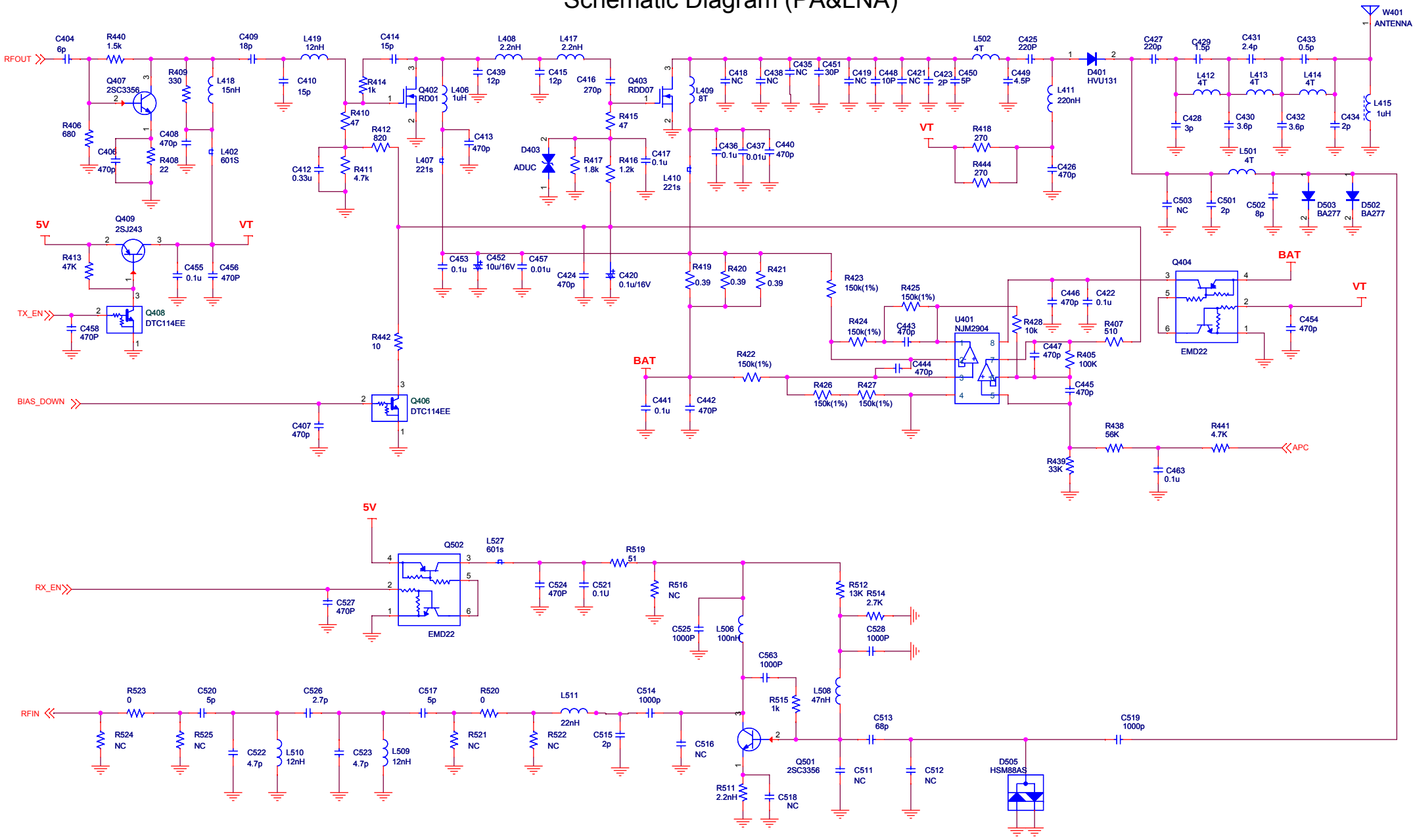
Schematic Diagram (IF)



Schematic Diagram (MCU&POWER)



Schematic Diagram (PA&LNA)



17. Specifications

General	
Frequency Range	400 – 470MHz
Channel Capacity	16
Channel Spacing	25 KHz /12.5KHz
Operating Voltage	6.0V DC
Battery	1100mAh (Ni-MH Battery)
Battery Life (5-5-90 Duty Cycle)	≥7 hours
Operating Temperature	-20℃ – +60℃
Dimensions (H×W×D) (with standard battery, without antenna)	109×54×34mm
Weight (with standard antenna & battery)	270g
Frequency Stability	±2.5ppm
Receiver	
Sensitivity	≤0.251uV/0.282uV
RX S/N	≥45dB/40dB
Adjacent Channel Selectivity	≥65dB/55dB
Intermodulation	≥55dB/50dB
Spurious Response Rejection	65dB
Rated Audio Power Output	0.5W (Speaker impedance: 4 ohm)
Rated Audio Distortion	≤5%（0.5W）
Transmitter	
RF Power Output	4W

Spurious and Harmonics	≤-26dBm
Modulation Limiting	≤5KHz/2.5KHz
FM Noise	≥40dB/35dB
Modulation Distortion	≤5%
Adjacent Channel Power	≤-70dB/-60dB

Note:

All Specifications are tested according to TIA/EIA-603, and subject to change without notice due to continuous development.

We endeavor to achieve the accuracy and completeness of this manual, but no warranty of accuracy or reliability is given. All the specifications and designs are subject to change without notice due to continuous technology development. Changes which may occur after publication are highlighted by Revision History contained in Service Manual.

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